IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication OCTOBER 26, 1961

Helen Grant

★ Space Scientists Pickering and Ritchey:

The Complex Problems Of Managing Research p. 53

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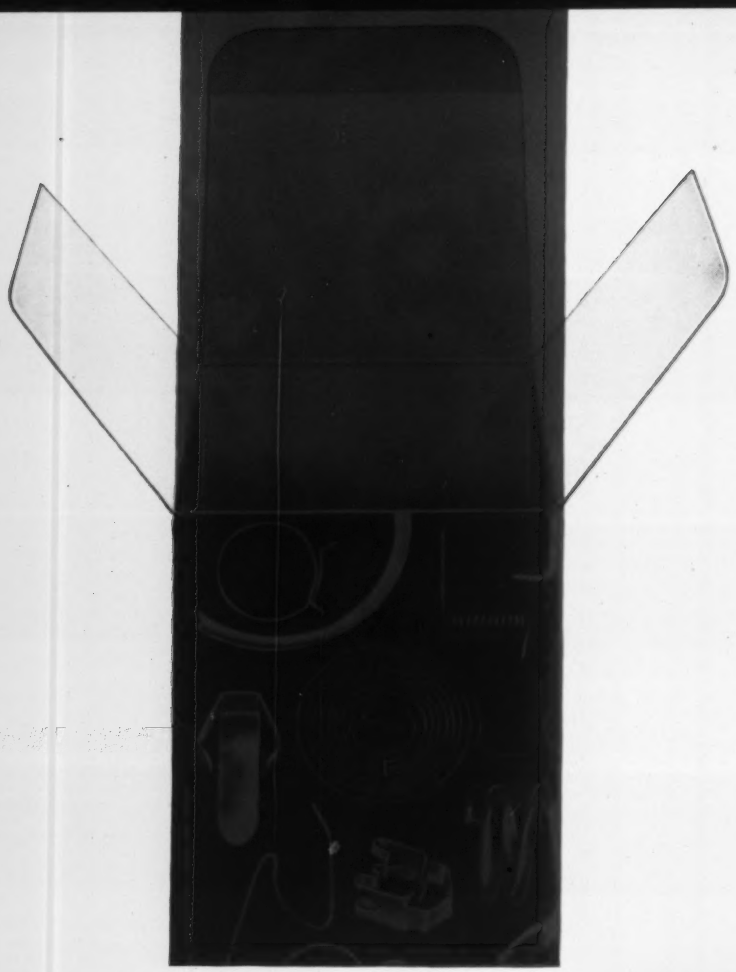

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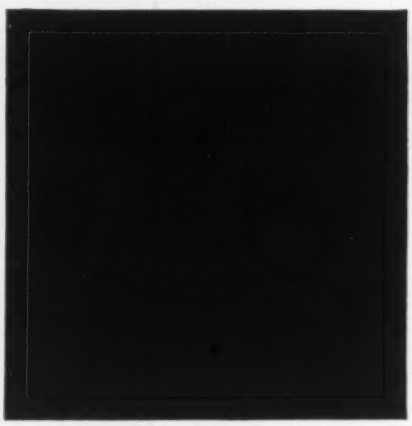

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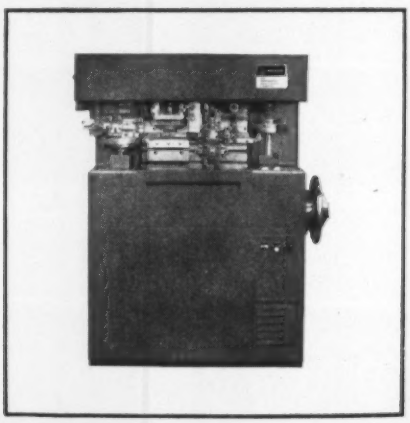

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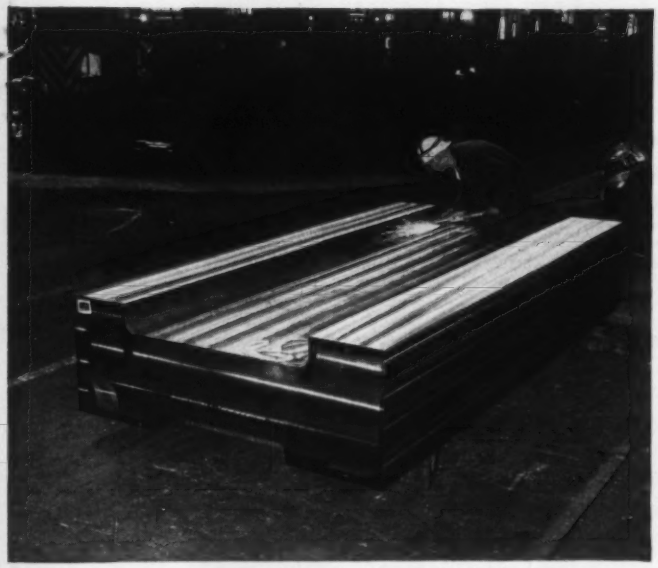
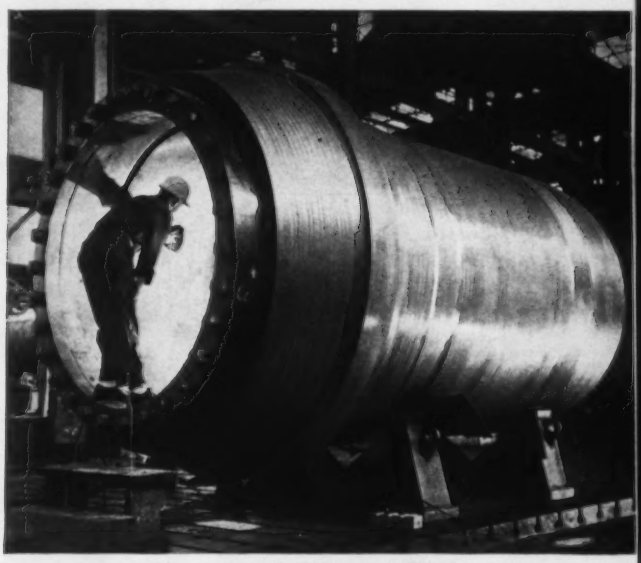
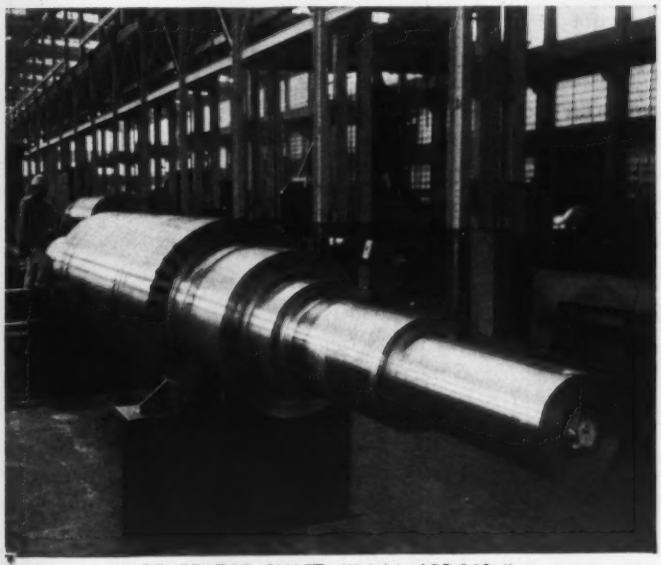


RAM ADAPTER. This forging weighs 58,780 lb, and measures 140 in. x 73 in. x 25 in.



STEEL CYLINDER for use in 7,500-ton plate stretcher. This forging weighs 171,240 lb, and it's 17 ft, 3 in. long.



GENERATOR SHAFT. Weight, 198,240 lb. As you can tell from these photos, Bethlehem is well-equipped for machining.

REACTOR VESSEL CLOSURE. The OD of this 50,660-lb forging measures 12 ft.

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IRON AGE

October 26, 1961—Vol. 188, No. 17

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Indexed in Applied Science & Technology Index and Engineering Index

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The IRON AGE, published every Thursday by CHILTON COMPANY, Chestnut & 56th Sts., Philadelphia 39, Pa. Second class postage paid at Philadelphia, Pa. Price to the metalworking industries only, $2 for 1 year, $3 for 2 years in U.S. Canada $10, all others $15 for one year. Latin America $25. Other foreign $35. Single copies 50¢. Annual Issue $2. Cable: Chilton Philadelphia.

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Special This Week

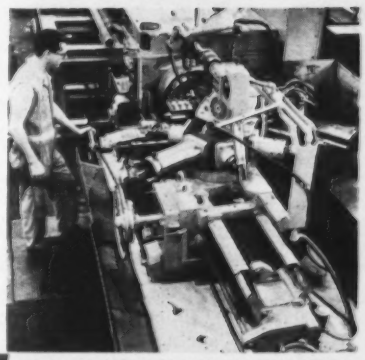
Can Space Researchers Keep Pace?

With technology moving ahead at rocket speed, research management in the aerospace industry has taken on unprecedented complexity. In this week's cover story, leading research managers tell how they are meeting these problems. p. 53

ON THE COVER: (left to right): W. H. Pickering, director, Jet Propulsion Laboratories, Cal Tech, and new president of the American Rocket Society; and H. W. Ritchey, director of Rockets, Thiokol Chemical Corp., last year's president of the Society.

What Japanese Slowdown Will Mean

"Go slow" policies of Prime Minister Ikeda (right, with President Kennedy) are taking effect in Japan. Editor-in-Chief Tom Campbell reports what's ahead for the Japanese economy and how slowdown will affect business relations with Japan. p. 60



Computer Plans Production Runs

A computer and an integrated data-processing system establish production-run schedules at the Timken Roller Bearing Co. Timely installation of modern machine tools rounds out this company's highly-efficient production levels. p. 83

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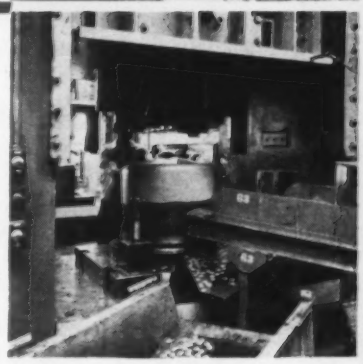

How to Make Quality Pay Off

If you've got a quality control problem—and who hasn't—why beat around the bush? Why not solve the problem at its source? Next week's special feature tells how you can gain production and consumer benefits by getting down to the root of the problem.

AT 3 A.M. ON SUNDAY

OUR CUSTOMER HAD TO HAVE A BEARING . . . HE GOT IT FROM 100 MILES AWAY IN LESS THAN 5 HOURS!

That's what we mean by around-the-clock service!

Our branch manager got a call on Sunday at 3 a.m. from his customer. A press, imperative to their operation, was out of service with a broken bearing and a replacement had to be installed in a matter of hours.

Our man checked his branch and found that this was a special bearing which his records showed was in stock at another branch 100 miles away. A call to this branch manager at 4:30 a.m. alerted him to meet a chartered plane at a nearby airport at 6:30 a.m.

We delivered the bearing to our customer at 8:30 a.m. A total elapsed time of less than five hours on a Sunday morning . . .

We are not often called on for such service — When we are, and the need is crucial, you can depend on it — Any one of our many branches can and will go all out to deliver the bearings you need, when you need them!

Get to know our bearings engineers and how they can help you. Call the branch nearest you!

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Report From Japan

Foreign Competition: It Grows and Grows and Grows

Competition from foreign suppliers, manufacturers, and merchants is more than mere statistics. It is deep-seated. It is serious. It will get more serious in the years to come.

Even if the government agreed to it—and it won't—tariff walls aren't the overall answer. We depend heavily on the rest of the world.

Much of our basic raw material comes from abroad. We have to deal with other nations if we want them to deal with us. Endless philosophical arguments help little.

There is much that we can do. We must push our government hard to back us up on eliminating cumbersome foreign tariffs against our products. We are used to hearing that we are the ones who set up tariff walls. The reverse is often true. A complete campaign — already started in some fields—should result in better treatment of U. S. goods. This despite the growth of Europe's inner six and outer seven.

But another positive point in our favor is the respect and the demand abroad for U. S. goods. In more cases than not, price is not the controlling factor. Many foreign nations — Japan, France, England, Canada, South American nations, and others—have a long history of favoring U. S. goods.

True, there have been changes, but deliveries, style, quality, salesmanship and design are still major reasons why we ought not give up so easily.

When we throw up our hands and talk incessantly about higher costs, lack of help, etc., we are licked before we start. Many U. S. manufacturers are selling in Asia and in Europe right under the noses of their "just-as-good" foreign competitors. But you have to work at it and the fellow who is doing it is not giving his trade secrets away.

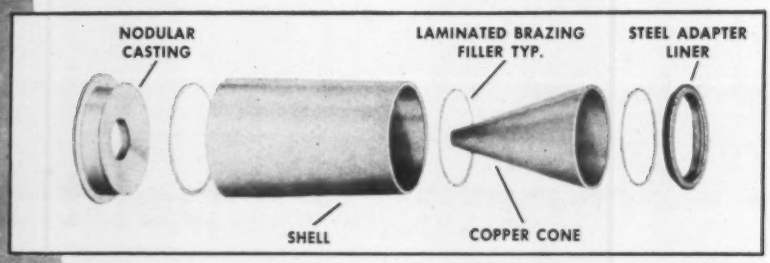
Then there is the question of what made America great. It was mass consumption, new products, better machinery, and technical progress. We were ahead of other nations. We taught them what we were doing. They liked it and now they are soaring ahead at the speed we used to go.

It is our turn now to have a break-through and make new products, new techniques, new gambles, to establish a new technological gap between us and our foreign competitors.

Research, rugged individualism, chance-taking, brains—and salesmanship—can do this before it is too late.

Tom Campbell

Editor-in-Chief



The four components of the nose assembly—nodular iron casting; low-carbon welded steel canister which measures 34" long, 15½" diameter at one end and 17¾" at the other; spun copper cone and low-carbon steel ring. The thinner rings are Easy-Flo 45 wire braided for precise alloy position and control.

Martin Develops New Induction Heating Methods to Braze Lacrosse Missile Assembly With EASY-FLO 45

One of the largest assemblies yet brazed by induction-heating techniques is a section of the Lacrosse missile being manufactured at The Martin Company's Baltimore Division. During development, one problem was posed by the variety of metals used. First it was necessary to braze a low-carbon welded steel canister and nodular iron casting. Then, to complete the assembly, a spun copper cone and low-carbon steel ring were joined to the canister. An induction coil was designed by Martin to accomplish this critical operation. Temperatures had to be restricted between 1300 and 1350°F to prevent a transformation change to the crystalline structure of the nodular iron. Martin's Materials Engineering Laboratory made careful examinations of this assembly and found that Handy & Harman Easy-Flo 45 Silver Brazing Alloy and B-1 Flux make possible the strong, uniform joints necessary to meet the stringent requirements the Company has set. Its low-working temperature, high strength, fast penetration and flow characteristics are only a few of the features which make this brazing alloy ideal.

More and more aircraft and missile components are being made with the aid of Handy & Harman silver brazing alloys and flux. The products described here are just two of the many available to help solve your problems...make your job easier and quicker. For a more complete picture of silver brazing and the advantages it offers you, write for your free copy of Bulletin 20.

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New Forecast Tool Available

A new, monthly forecast tool for businessmen was launched this week. The Business Cycle Development report, prepared by the Census Bureau, shows U. S. prices, profits and labor costs favorable to further upturn.

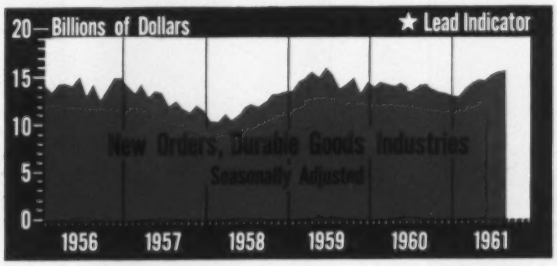
The new report, say Commerce Dept. officials, will help businessmen make "a good forecast of short-run economic trends." It covers 350 economic indicators.

Up-to-date, the report is published the 20th of each month and includes data gathered as late as the 15th.

Commerce Dept. offices handle requests for copies.

Durable Goods Orders Rise

Durable goods manufacturers' new orders rose to $15.7 billion in September, up $100 million from August. This is the eighth straight month of rising orders for durables. And orders exceeded sales as the latter fell $200 million during the month to $15 billion.



The September showing of new orders reflects across-the-board strengthening of durables. Little help came from the auto industry. The sales drop for the month was largely a reflection of curtailed auto sales.

Income Rises In September

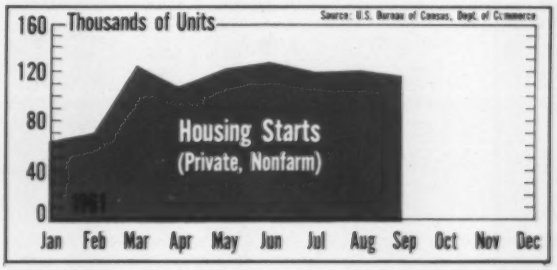
Personal income in September rose to a near-record $420.2 billion. This is up from August when income was $419.3 billion.

Most of the September income gain was due to increases in wages and salaries in retail and wholesale trades. Income of employees in manufacturing industries dropped by $400 million in September. About half of this drop was due to the General Motors strike.

New record income level will be set soon. But the big question is when does the spending come?

Housing Holds Its Own

Less private residence building was started in September than in August. Preliminary data shows that 118,800 private nonfarm units were started in September, down from 123,600 in August. However, after seasonal adjustments, there is a rise in the annual rate to 1,343,000, up from 1,296,000.



More realistic credit rates in mortgages will come soon and keep housing from sagging. But they won't lift it.

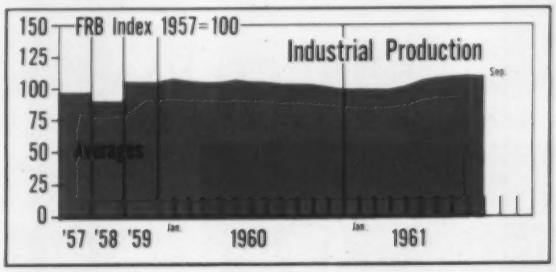
Japan: No Money, No Scrap

Slowdown of exports of scrap to Japan is attributed to a number of factors. One is an apparent glut on ships and dock facilities. Real reason is a clampdown in imports to Japan because of the country's unfavorable balance of payments. And a drop in dollar reserves.

The Japanese can also be counted on using the slowdown to bring U. S. export prices down.

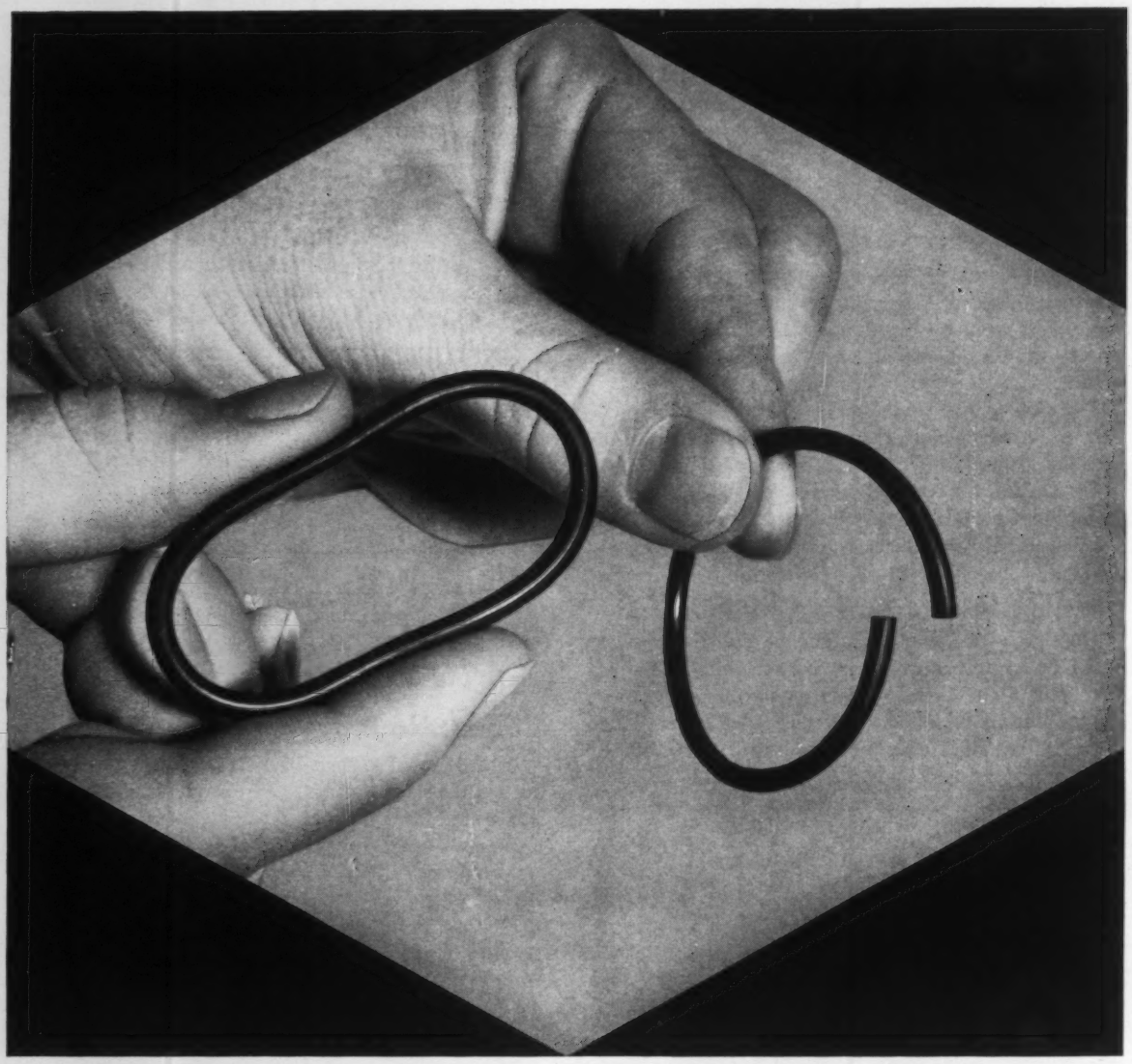
Industrial Output Dips

After six months of a rising trend, it took a hurricane and a strike to halt the advance of U. S. industrial production. The Federal Reserve Board index of industrial production in September dropped to 112, down one point from August.



The FRB says hurricane Carla crippled some petroleum production. And the two-week shutdown of General Motors auto plants took a second toll.

With steel lagging in the face of tight inventory buying, and with the Ford walkouts taking a toll, October may not be any better than August.



Reduce loss from leakage due to brittle seals, cut downtime needed for seal replacement. Extend the life of your Buna N and neoprene packings and seals with quality Sun Solnus oils. In a special test for oil-seal compatibility, Sunoco researchers immersed a set of O-rings in Sun Solnus oil, and a second set in another hydraulic oil, for 70 hours at 300 F each. The O-rings in the Solnus oil (*above, left*) retained their flexibility. Other rings (*right*) turned brittle as the oil robbed the rubber of its plasticizers. In addition to keeping rings flexible, Solnus oil restores flexibility to brittle rings already in service.

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PIONEERING PETROLEUM PROGRESS FOR 75 YEARS

Metalworking Newsfront 2

Still Too Many Missile Site Walkouts

The Administration may get even tougher on work stoppages at U. S. missile and space sites. Stricter rules against walkouts may come in view of a jump in stoppages at the sites last month.

Reporting to President Kennedy, Secretary of Labor Arthur J. Goldberg said the labor situation improved in June, July and August. These were the first three months after union and management leaders pledged there would be no strikes or lockouts at the sites.

In September, however, 1136 man-days were lost at missile bases due to "unauthorized walkouts." This was a big improvement over September of last year. But Mr. Goldberg said "it is too high in view of the critical importance to the nation of our missile and space programs."

The extent of the improvement points up the better situation now, and also underscores the sad state of stability on missile sites before the agreement.

In June, July, and August of this year, only 768 man-days were lost compared with 34,532 man-days in the same period of last year. The 1136 man-days lost this September, although an increase from previous months, was still a big improvement over the 4979 man-days lost in September of 1960.

Plant Safety Standards Needed

Is the well-managed shop likely to be a safe shop?

In their efforts to measure the effectiveness of accident prevention programs, specialists in industrial safety are evolving some unusual measurement programs. These often prove more effective than traditional measures of accident frequency.

For instance, one authority points out that the statement that a well-managed shop is an accident-free shop has proven so true that correlations between rework cost, scrap loss, and overall production costs have been used to predict worker accident rates.

Safety men say a brand-new measure of industrial safety is needed; **that it will probably come from examination of production records.**

Foundry Unions Seek "Block" Bargaining

Foundry men report that their unions are seeking to consolidate their demands so that locals will bargain in "blocs," at least as far as unified demands go.

The International Molders and Allied Workers Union is spearheading the drive. The ultimate goal is merging local unions into area-wide bargaining units.

President's Labor Study

Can a Labor-Management Advisory Committee, even if responsible to the President, come up with anything like agreement on such broad subjects as?

Economic growth and unemployment;

Policies designed to ensure that

REYNOLDS: Toward wide areas of agreement?

American products are competitive in world markets;

Sound wage and price policies.

The President's committee, with its three subcommittees wrestling with such knotty problems as these, has had its fifth meeting. Secretary of Labor Arthur J. Goldberg says final reports will "reflect wide areas of agreement."

In its last meeting, the committee indicated it is working toward final reports on automation and free and responsive collective bargaining. Final action on the reports is set for the next meeting Nov. 28.

Even the optimistic Mr. Goldberg did not hope for unanimous reports. But dissents will be footnoted; there will be no majority or minority reports. Then, when adopted by the full committee, they will be submitted to President Kennedy.

Some of the key figures on the committee:

From industry: Joseph L. Block, chairman of Inland Steel; Richard Reynolds, president of Reynolds Metals; Henry Ford II; Thomas J. Watson, president of IBM.

From labor: David J. McDonald, president of the United Steelworkers; Walter P. Reuther, president of the United Auto Workers; David Dubinsky, head of Garment Workers.

CINCINNATI

CINCINNATI's

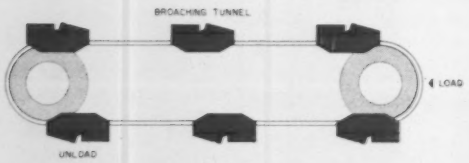
Long Experience in Surface Broaching Applied to *Chain Type* Machines

CHAIN BROACHING implies very high production. But very high production equipment sometimes limits design changes in the part. New CINCINNATI Chain Broach Machines retain the high production characteristics of closed loop cycles while adding a new advantage . . . they're adaptable to change. A unique method of attaching the work-holding fixture to the chains permits a welcome freedom of replacing or adding fixtures.

Straight-line traverse of fixtures through the broaching "tunnel" is assured by extra rugged guide bars. A pressurized coolant system and an endless conveyor automatically remove chips. To facilitate maintenance and adjustment of broach inserts (cutters), the top of the broaching tunnel is hinged and can be readily opened.

The CINCINNATI Chain Broach illustrated here is tooled up to broach door hinges for a prominent Illinois manufacturer of builders' hardware. Interchangeable fixture elements accommodate several sizes. With the exception of manual loading, the complete cycle is automatic and continuous, resulting in a production rate of 924 hinge leaves per hour.

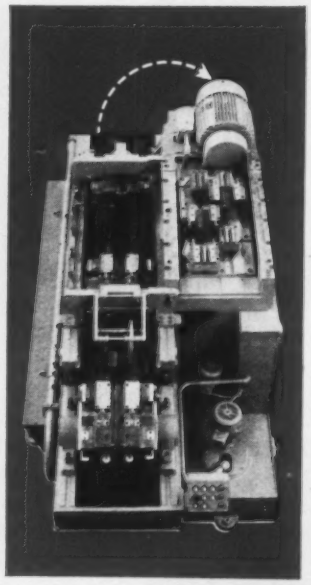
The new Chain Broach Machine is a typical example of advanced thinking and modern approach to low-cost production which Cincinnati imparts to broaching and other metalworking machines and production lines. May we help you with your machining problems? Write or telephone for information. **Special Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.** *REdwood 1-2121.*

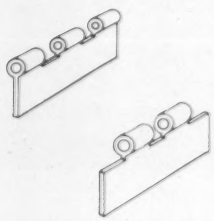


Chain broach principle: a closed loop continuous production cycle. Fixtures indicated in red can be replaced or more added.

New CINCINNATI Chain Broach Machine. Can be built in various sizes and tooled up for many types of high production jobs, such as machining the door hinge leaves shown below.

Photograph courtesy of Lawrence Brothers, Inc., Sterling, Illinois





Removal of broach inserts (cutting tools) for re-grinding is facilitated by merely opening the hinged top, as illustrated at left.

SPECIAL MACHINES • HORIZONTAL BROACHING MACHINES • COMPLETE PRODUCTION LINES

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SPECIAL MACHINE DIVISION

★ How Much Depreciation Aid?

Manufacturers in many industries seeking new depreciation allowances from the U. S. Treasury Dept. are finding out the so-called "reform" is no giveaway.

Determination of depreciable "lives" of equipment, as done for textile machinery, is not going to be haphazard.

Treasury Secretary Douglas Dillon points out that his department's investigations "may not justify equally large reductions in the depreciable lives of equipment used in other industries." Depreciation periods on textile machinery were cut from 25 or more years to 12-15 years.

While Secretary Dillon promises "reductions of a significant nature" in other industries, these industries will have to prove they need shortened "useful lives" for their equipment.

As in the case of the textile industry, it turns out, an industry seeking this type of tax relief will have to negotiate changes with the department.

Sec. Dillon says depreciation period adjustment "calls for a detailed study of the whole range of business experience with all types of equipment." The Treasury started such a study more than a year ago. The study, which considers all depreciation methods, is expected to be completed in several months. The textile industry was given priority treatment at President Kennedy's request.

The schedule of "useful lives" can be changed arbitrarily by the Treasury Dept., but an overall depreciation reform takes legislation. The Treasury Dept. study now being completed will be reported to Congress next year. Whether it leads to depreciation legislation remains to be seen.

■ FTC: Price Cutting Legal to Hold Buyers

Robinson-Patman Act laws barring reduced prices are getting significant interpretations in Washington. The Federal Trade Commission has ruled that discriminatory price reductions are legal only when offered in good faith to keep old customers.

The FTC action follows closely a U. S. Supreme Court decision to rule whether or not the Justice Dept. can enforce a Robinson-Patman act ban on "unreasonably low prices."

The FTC ruling allows a company to offer reduced prices to certain customers to meet price cuts by competitors, but not to capture new business.

The Supreme Court's case will decide the fate of below cost sales. The High Court will decide if the act's language—"unreasonably low prices"—is too vague to be enforceable.

■ Congress May Decide Patent Policy Squabble

The controversy over government patent policy may be ended next year by Congress. Sen. John L. McClellan, (D.-Ark.), head of a Senate patent committee, expects to draft a patent bill early in the next session.

Sen. McClellan says, "If the government is to have a consistent patent policy the congress will have to decide whether ownership of these inventions should reside in the contractor or the government."

Defense Dept. contracts are mainly in question. Generally, Defense contractors give the government a royalty free use license on inventions arising from contracts while holding commercial rights.

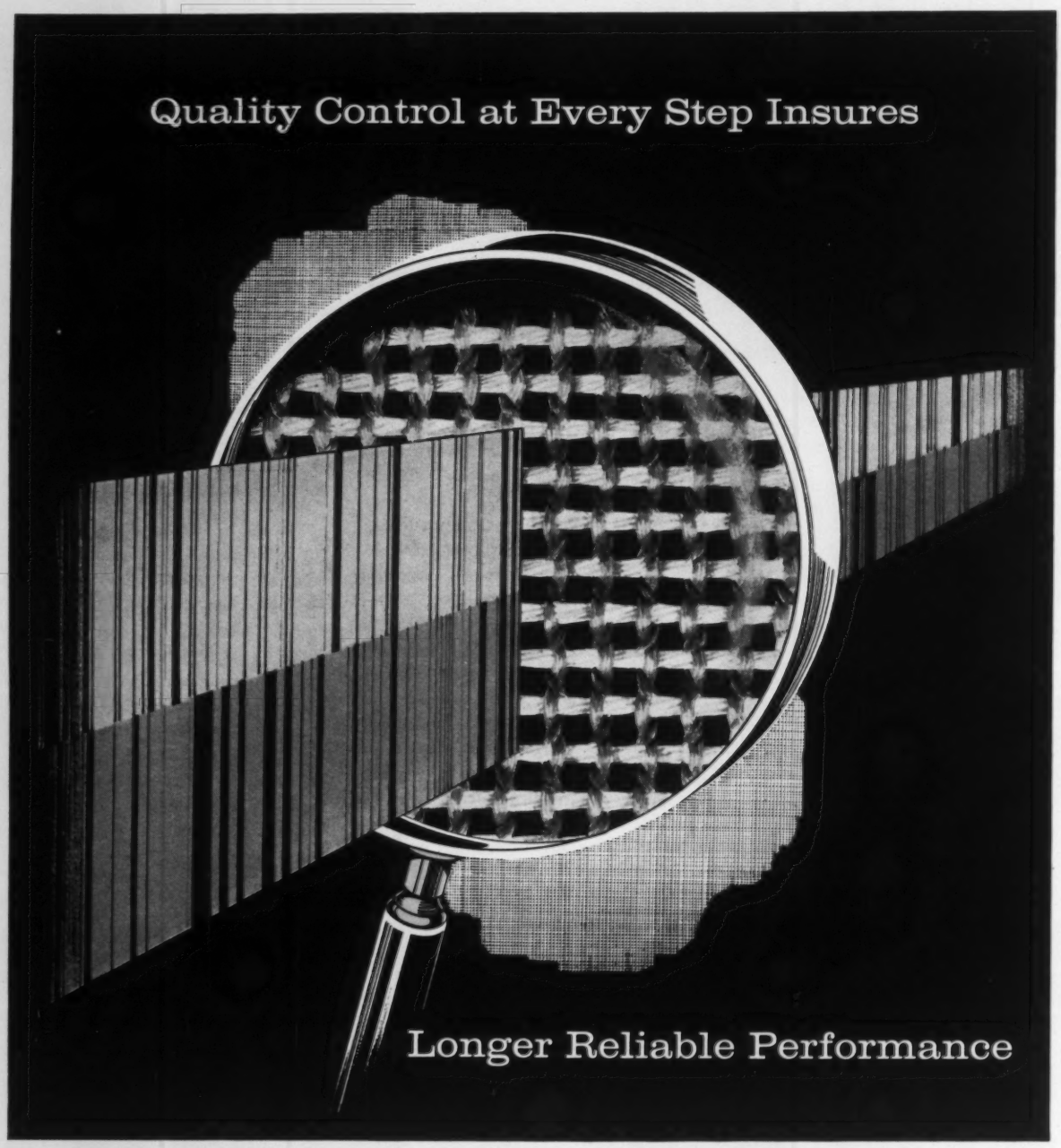
■ U. S. Studies Aid To Domestic Iron Mines

The U. S. Interior Dept. is studying the condition of the domestic iron mining industry on orders from President Kennedy. And a Congressional committee is considering a similar investigation.

The President informed Rep. John B. Bennett (R.-Mich.), that the study would be made. It was Congressman Bennett who asked the President to consider stockpiling iron ore and imposing quotas on iron ore imports.

REP. DENT: Do ore imports hurt?

The Congressional committee investigation was requested by Minnesota's Governor Elmer A. Andersen. The governor asked Rep. John H. Dent, (D.-Pa.), head of the committee on the impact of imports and exports, to hold hearings. The governor told Congressman Dent, "One of the main factors causing this is the importation of foreign iron ore."



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Australians Expand Steel for Export

During the next decade, Australia's iron and steel industry aims to build a permanent export market.

Steel production to date has been unable to meet peak home demand. Industrialization, national income, and population (now 10.5 million) have all had tremendous growth. And steel demand in Australia has been rising since World War II at an annual rate of 6 pct compounded, one of the highest anywhere.

However, in the past 15 years basic iron and steel producers have invested $405 million in new equipment and plants. The demand-supply gap is steadily closing with continuing expansion.

Australia should be self-sufficient in all steel products by 1965-66.

At present, Australia produces about 3.5 million tons of ingot steel per year. By 1970, this is expected to double to between 6 and 7 million tons annually.

In the last 20 years, Australia has consolidated itself as the third largest iron and steel producer in the Commonwealth. It is closely behind the United Kingdom and Canada.

Since 1946, production of pig iron in Australia has jumped from 1.1 million tons per year to the current near capacity rate of 2.6 million tons. Finished steel products are being turned out now at an annual rate of 2.3 million tons.

The industry can now supply all Australian requirements of flat-rolled products, such as plate and sheet, and meet most demands for wire and pipe.

Basic iron and steel is produced in Australia by a closely associated group of companies under the central control of Broken Hill Proprietary Co. Ltd.

MAJOR WORKS: New South Wales steelworks of BHP Co. Ltd.

BHP is a public corporation, owned by 60,000 shareholders. It is linked through ownership with 16 proprietary companies. The largest of these, like BHP, produces basic iron and steel. The others work semi-finished steel into finished steel products.

In addition to its own group of companies, BHP is linked financially with Australia's steel tube, container, and aircraft industries.

BHP has brought new efficiency and growth to Australia's iron and steel development.

The company is carrying out a long-range program of plant modernization and expansion. In recent years, BHP and its subsidiaries have invested $56 million per year in capital works.

Australia's objective for the next decade: Continuing investment at a high rate in new iron and steelmaking facilities to get the capacity to build a permanent export market.

Soviet Salesmanship

Russia dominated the International Trade Fair at Montreal this year. Soviet salesmen took almost a third of the total floor space. U. S. and Britain were not represented.

Will U. S. Hold Own In Common Market?

England's entry into the Common Market has stirred a mild trade storm in the U. S.

Businessmen are asking themselves: What will the new alignment mean to us? Will we be backed against the wall when the European trade family shapes up?

Congress has reacted. Hearings will be held in December to come up with recommendations for the next session.

Rep. Hale Boggs (D., La.) heads the House Foreign Economic Policy Subcommittee which will hold the hearings. The object: To give U. S. businessmen new tools to negotiate trade pacts with the European group.

Rep. Boggs is convinced the growing Common Market will change trade concepts on both sides of the Atlantic.

U. S. Bearing Exports Continue to Climb

Exports of ball and roller bearings from the U. S. continued to climb during the first half of 1961. Exports now account for 8 pct of total production.

In the first half, exports totaled $29.622 million. At this rate, total exports for 1961 will top total 1960 exports of $55.727 million.

Giant Slabbing Mill Ups Scottish Output

Colvilles Ltd. is building a giant $22 million slabbing mill, part of a $300 million Scottish steelworks expansion program. It will feed the new steel strip mill at Ravenscraig, Motherwell.

When expansion is completed, Colvilles will have a steelmaking capacity of 3.7 million tons per year.

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Adds Current to Burner

A new type of burner, developed by Combustion and Explosives Research, Inc., produces flame cores hot enough to melt tantalum. Natural gas and air are premixed, fed to the burner ports, and ignited. Alternating current is then added to increase flame temperatures to 6000°F. The company claims the unit will lead to more efficient production of aluminum, steel and pure iron. Cost savings are the payoff.

Stress-Corrosion Nemesis

A new heat treatment cuts stress-corrosion problems for aluminum alloy 7075, according to Alcoa. With this new treatment, the alloy withstands sustained surface-tension stresses equal to 75 pct of its yield strength—without stress-corrosion cracking. Die forgings, rolled rod and rolled bar are available in the new T73 temper.

Steel's Achilles Heel

Hydrogen gas affects steel in two quite different ways, according to researchers at the University of Wisconsin. At temperatures under 500°F, steel absorbs the hydrogen, which forms tiny bubbles that weaken the steel's structure. At high heats, hydrogen combines with carbon in the steel to form methane gas. This loss of carbon tends to change the steel back to ordinary iron

Gages Radial Strain

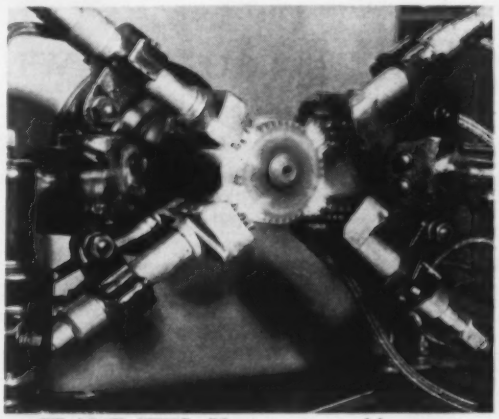
An unusual new testing device uses metal-foil strain gages to sense the average diametral strain in a cylindrical specimen during cyclic loading tests. Electrically, the four gages are arranged as the arms of a wheatstone bridge. Their signal can be amplified to provide any desired calibration for a recorder. The instrument lets you prepare low-cycle fatigue specimens with an accurate history of cyclic strain that aids in test evaluation.

Throw Away One Epoxy Can

Stable, one-can, epoxy resin systems that cure at room temperature are now a reality. In a new method devised by Linde, the active hardener is held within the pore structure of Molecular Sieve adsorbants. Hardener is completely isolated from the system since the larger molecules of epoxy resin cannot enter the pores. At the proper time, "caged" hardener is released by a displacing agent, such as atmospheric moisture.

Burns Up Hardening Time

By means of high-temperature flame jets, a new device at GM's Oldsmobile Div. in Lansing, Mich. hardens machine replacement gears in a fraction of the time required by a previous method. Now, in less than a minute, flames harden



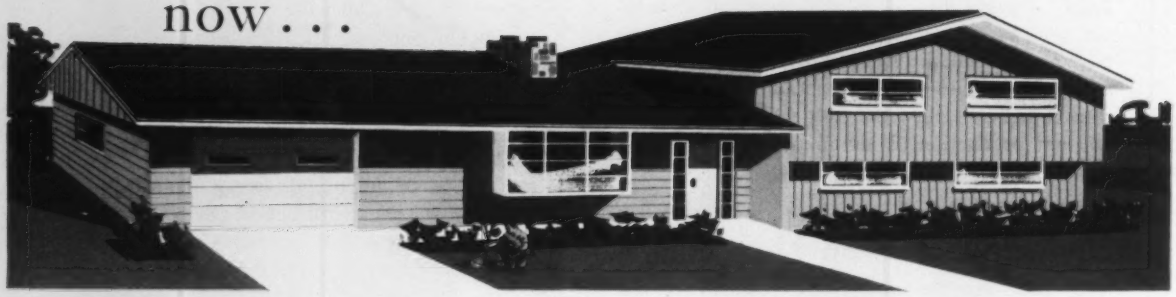
FLAME JETS: Heat treat machine gear.

the gear profile to a 1/16-in. depth. Four fixed arms direct the flames onto the gear, as it slowly revolves on the mounting spindle. This procedure insures uniform heating. When the gear reaches 1550°-1600°F, it's ejected into quenching oil. The previous method took half a day.

Tough, but Nonmagnetic

Navy scientists have announced the development of new nonmagnetic alloys. Based on an intermetallic combination of titanium and nickel, Nitinol is corrosion resistant and unusually ductile. It hardens to 62 Rc, almost the hardness of tool steel. Toughness increases (up to 43 ft-lb impact strength) as the alloy's temperature drops. Still, it can be used to about 1200°F. In addition, its specific gravity of 6.45 means this strength is available without weight penalties.

looks
good
now . . .



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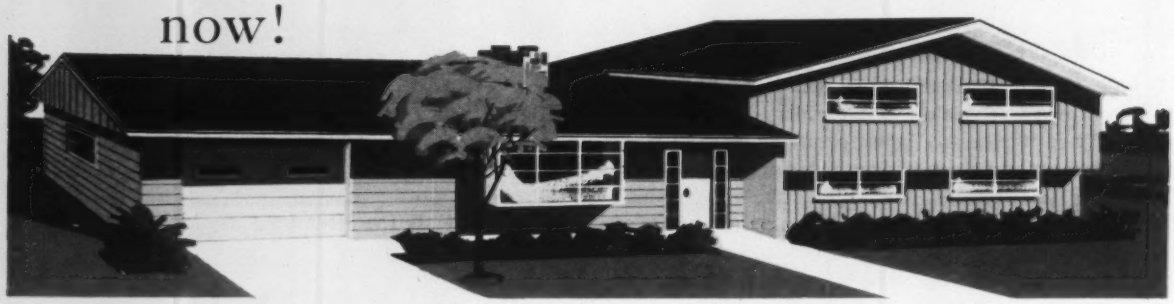
from
now!



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Editorials Approved

Sir—Here's strong applause for your fine editorial "Business Is Friendless: Make No Mistake About That" (Sept. 28 issue).

We need that kind of leadership in combating a pernicious trend in U. S. government away from the basic principles of our traditional individual freedom in private enterprise. There is a trend toward what I consider alien concepts of government—toward a "power entity" in its own right, functioning to "control," "direct," "regulate," "enforce" . . . all the traditional foundations of dictatorship.

We hear a lot about "dishonesty" in business. I submit that our government stance is becoming, or has become, dishonest in a very real sense by using our laws to subvert our established society . . . and by publicly mouthing one set of ideals while adhering covertly to another. —E. W. Robotham, Edward W. Robotham Co., Westport, Conn.

Sir—We read with great interest your editorial in the August 31 issue—"Have We Lost Our Marbles in Our Latin American Plans?"

I am of the opinion that your editorials are always to the point. It seems, however, that not only the marbles in Latin America are getting lost but also those in the Congo.—H. W. Balster, Dusseldorf, Germany.

Sir—I would like to acknowledge your editorial of Sept. 28 on the unsent letter to the President from Mr. Not-So-Big Steel.

I believe your composite ghost letter should be brought to President Kennedy's attention, and I am sure it has.

I am convinced you have expressed the feeling of many of us small processors of mill products.—R. W. Robberson, president, Robberson Steel Co., Oklahoma City, Okla.

Sheet Forming

Sir—I would appreciate reprints or tear sheets of the article "Take the Guesswork Out of Forming" which appeared in the Sept. 21 issue.—C. H. E. Beck, staff engineer, Missiles and Space Div., Lockheed Aircraft Corp., Sunnyvale, Calif.

Sir — Will you please forward two copies of this report on predicting sheet-metal formability. Thank you.—H. A. Peyser, manager, can forming and sealing development, Continental Can Co., Chicago, Ill.

Furnace Linings

Sir—We were very pleased with the treatment which our new container received in your article "Furnace Lining Time Tumbles" in the Sept. 7 issue. There were a lot of nice comments from our people in the field indicating that they also shared our feelings.

We appreciate the efforts made in this story by your West Coast editor, Ray Kay, and other members of your staff.—David S. Way, Kaiser Refractories & Chemicals Div., Kaiser Aluminum & Chemical Corp., Oakland, Calif.

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For Finest Plated
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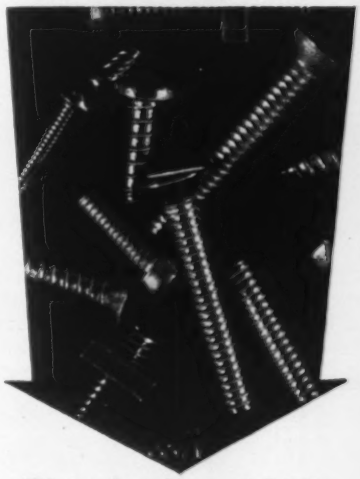

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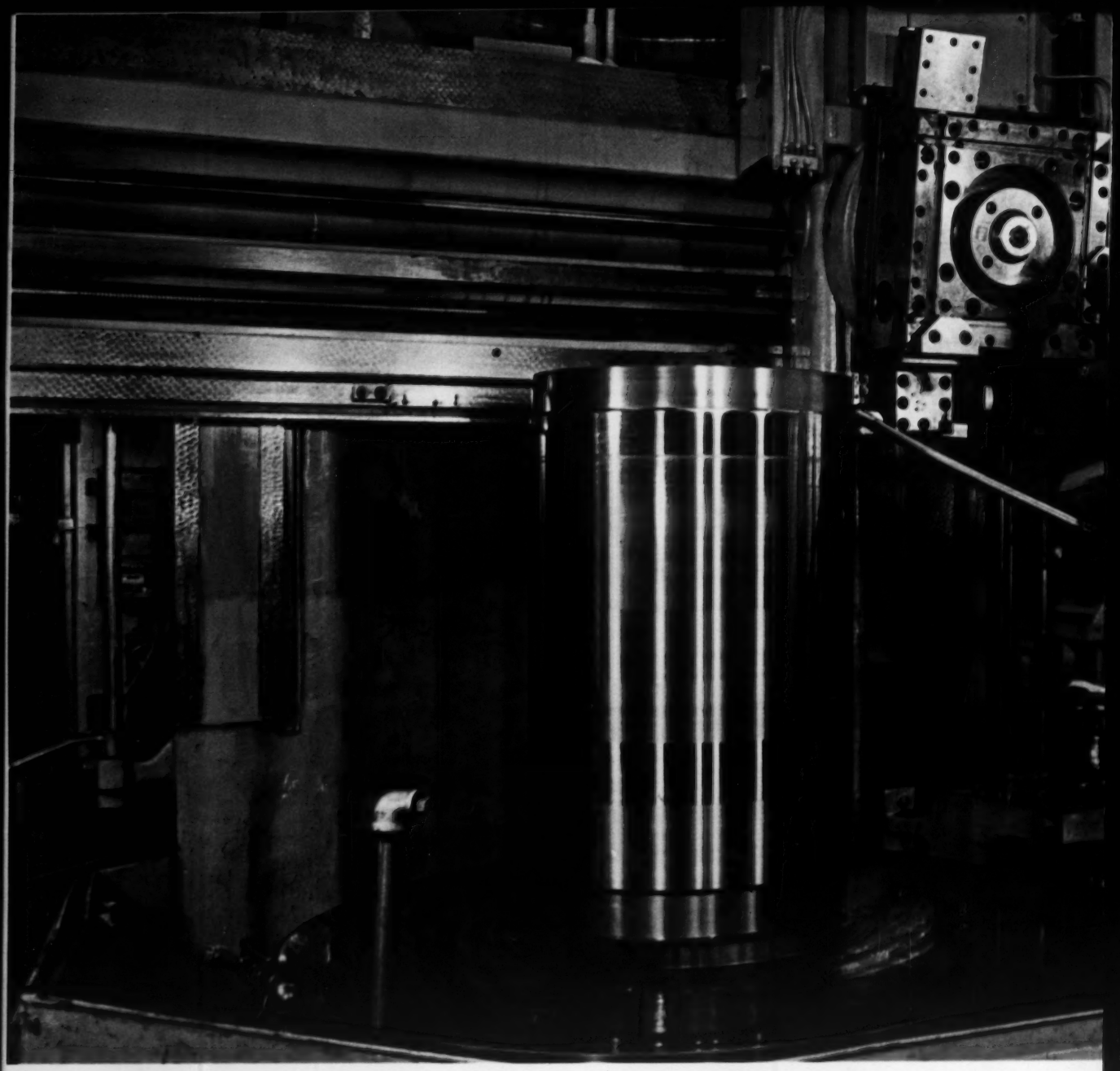
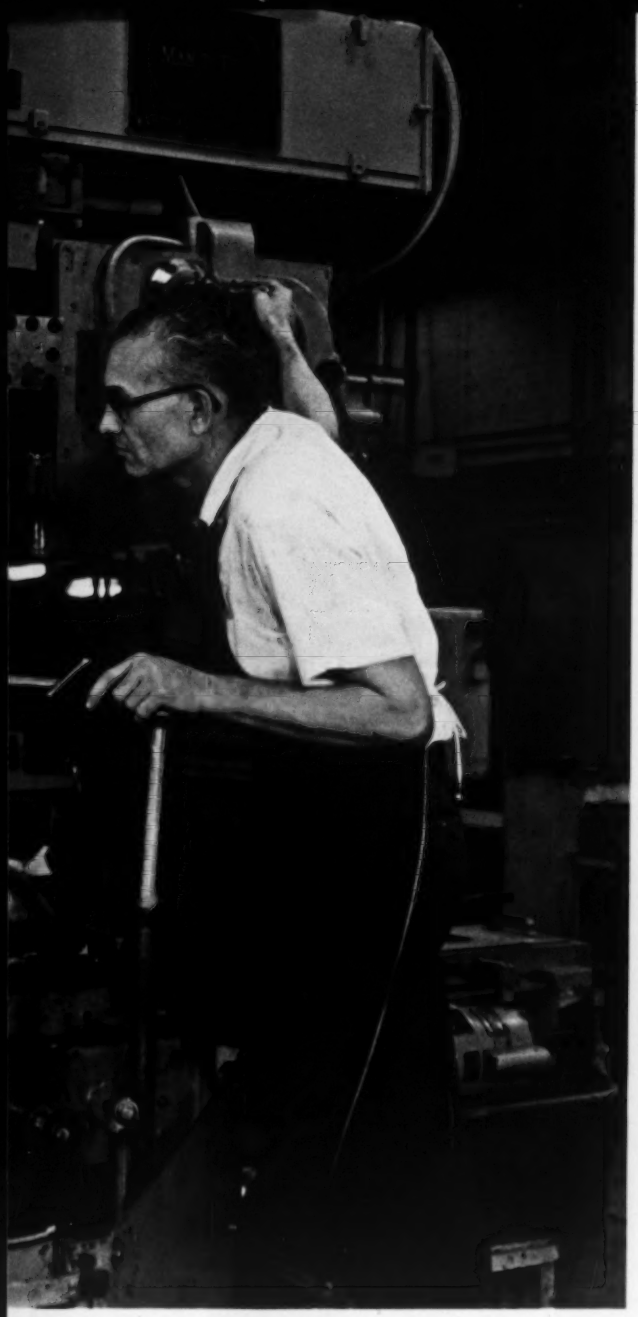


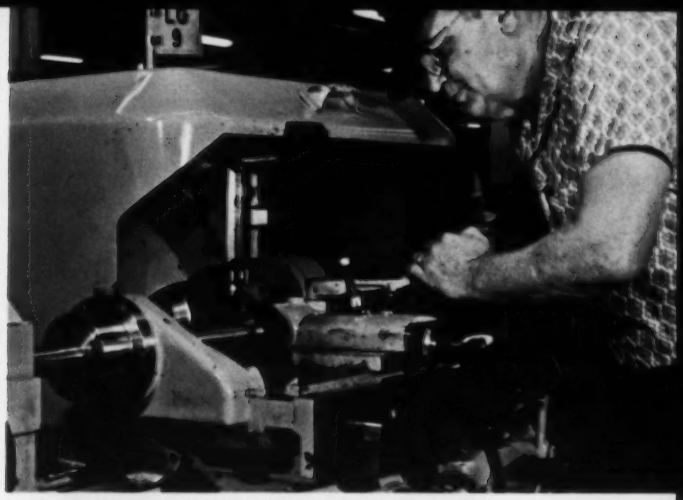
Chance Vought trims production costs with three Gulfcut® oils . . .

Machining operations at the Dallas, Texas, plant of Chance Vought, a subsidiary of Ling-Temco-Vought, Inc., seemed to require an inventory of dozens of limited-purpose cutting fluids. But the large inventory contributed to cutting oil misuse that increased production costs. However, Chance Vought solved this problem with three Gulf cutting oils.

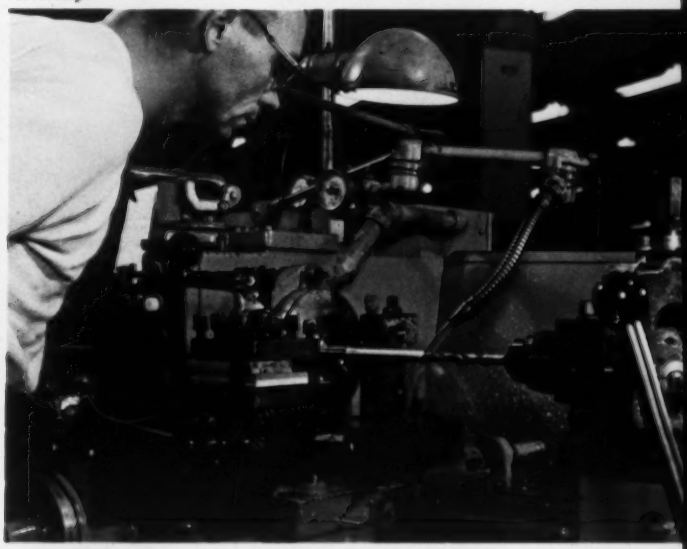
To simplify cutting oil selection, Chance Vought classified machining operations by category. Example: difficult machining jobs involving tough cutting and draggy ferrous metals. Here, Gulfcut 45B is used because it contains an extra-heavy concentration of sulfur, chlorine and fatty oil for excellent load-carrying and anti-weld features.

Another example: aluminum, magnesium and other non-ferrous machining operations where staining is highly objectionable. A versatile compounded mineral-lard oil, Gulfcut 11D, is used on this type of job. This oil's light viscosity also suits it for blending with other oils for special jobs.





Ex-Cell-O thread grinder. Workpiece is a special bolt trunnion attachment of AISI 4130 steel. Excellent tool life is obtained with Gulfcut 41TG. Operators report no rancidity.



Warner & Swasey No. 3 turret lathe. In position is an oil level indicator for an aircraft primary hydraulic system. Gulfcut 11D (light viscosity) keeps chips flowing freely.

Bullard vertical turret lathe. Workpiece is an AISI 4340 steel holder for an explosive die in which aircraft parts are formed. Gulfcut 45B is the cutting oil.

and cutting oil inventory
GULF MAKES THINGS RUN BETTER!

Next, there is thread grinding. The volume and nature of this operation dictates the use of a specially compounded thread-grinding oil. Gulfcut 41TG is used. This oil provides good finish, accurate tolerances, long wheel life. In addition, it contains an anti-foam agent and corrosion inhibitor—both important in circulating systems of thread-grinding machines.

"As a result," says Doy Stanley, General Foreman, Facilities,"we've been able to make notable purchasing economies. What's more, we've lowered over-all maintenance and production costs by lessening the risk of cutting oil misuse."

There's a right combination of Gulfcut oils to help cut your machining costs. For additional information call a Gulf Sales Engineer at your nearest Gulf office. Or write for Gulfcut literature. Gulf Oil Corporation, Dept. DM, Gulf Building, Houston 2, Texas.

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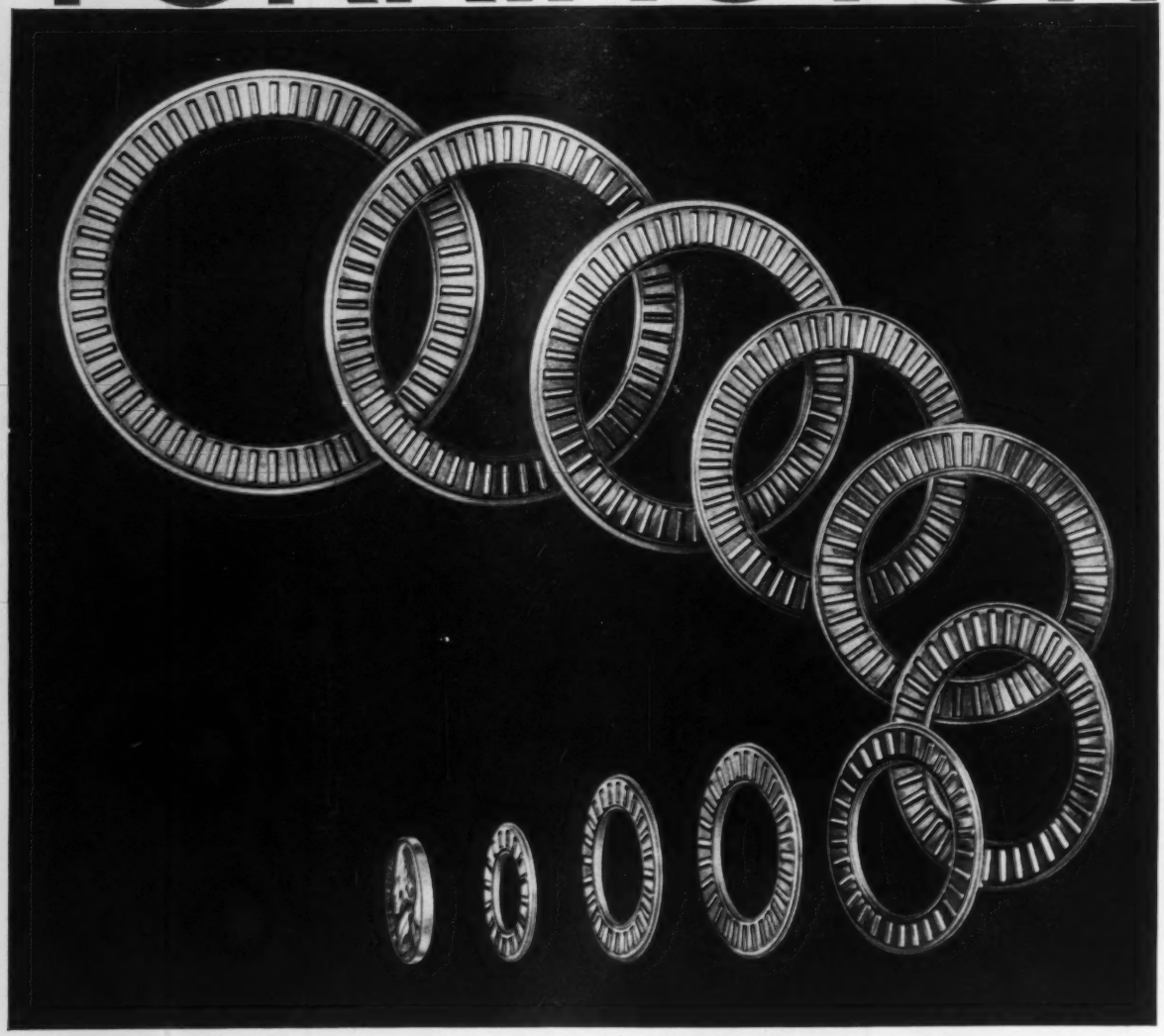

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Standard races are available. Otherwise Torrington Needle Thrust Bearings may be run directly on hardened and ground adjacent surfaces.

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Japan Revisited

You'll probably recall Editor-in-Chief Tom Campbell's series of stories last spring filed direct from the Far East. They covered a range of subjects of interest to U. S. businessmen and established him as an authority on the Far East, particularly on Japan.

This week Tom is just back from another whirlwind trip to Japan. And, we find out Tom has a dual role of being sought there as an authority on how business conditions in the U. S. will affect Japan.

Questions and Answers—In his short trip, he was interviewed by United Press International's Tokyo bureau, making the front page of at least one major newspaper there. He was also interviewed on Radio Tokyo.

In his second trip to Japan, Tom interviewed government people, executives in the Japanese steel industry, and machinery people. For the Japanese, he analyzed iron ore requirements for that country for the next 10 years—always a critical subject for a country which is short of raw materials.

BUSY MAN: Just back from an editorial fact-finding trip to Japan, Editor-in-Chief Tom Campbell was honored as "free enterprise newswriter of the year."

Problems and Awards — In this week's issue (p. 60) the Editor-in-Chief reports on Japan's current business problems, discusses how they will affect U. S. industries doing business with Japan.

Next week he will report on another special study he made in Japan: What is the future business relationship between Japan and Red China; how will it affect the U. S. and other Free World nations?

Incidentally, one of the reasons for Tom's fast return: He had to be in Chicago this week for a pleasant role; accepting the National Management Assn.'s award as "Free Enterprise Newswriter of the Year."

Magnesium Makes Hit

Another new metal product — a magnesium baseball bat—turned up at the recent meeting of the Magnesium Association in New York City. According to Dixie Walker, scout for the Milwaukee Braves and ex-major leaguer, the magnesium bat was used "experimentally" last season.

Players reported they were unable to notice any difference in its performance compared with wooden bats. They stressed the fact that there was no "sting" when hitting the ball.

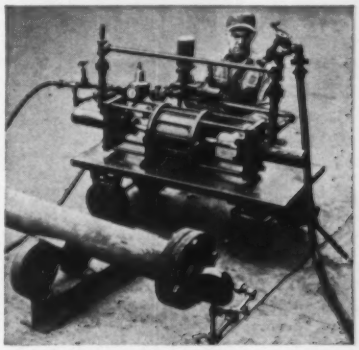
Throw Out the Old

Even the military, well known for trying to put square pegs in round holes, sometimes finds the right place for everything.

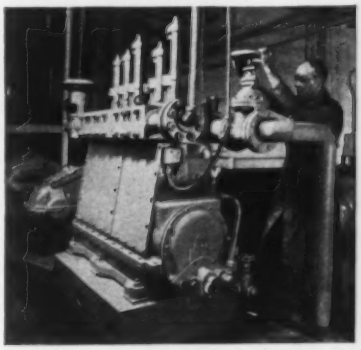
Ex-GI's will give a cheer to learn that in its latest batch of surplus property, the Army is selling for scrap paper some 35 tons of old Army regulations.

Unfortunately, it's a sure bet there are at least 70 tons of new booklets on order to replace the scrap. Things don't change that much.

Need a pump as tough as these?



A familiar sight at one plant is this Aldrich Hydraulic Pump. It's been given plenty of work to do pressure testing process equipment . . . pipe, heat exchangers, tanks, coils, special pressure vessels from 300 to 7330 psi. To get it from one of a dozen tasks to another, quickly, maintenance men have mounted the pump on a portable rig. The company reports that with this Aldrich Pump, equipment testing is faster, more efficient than before.



Two Aldrich reciprocating pumps lead a busy life here, keeping hydraulic presses on-line three shifts a day. For this molding and extrusion operation, pressures must be—and are—maintained at a steady, high level. The penalty for any deviation is up-and-down quality, soaring reject rate. This is rugged duty, but no unscheduled downtime has ever occurred since the pump was installed.

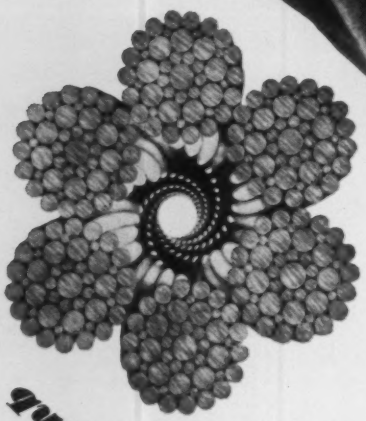
For pumps of 5 to 2500 hp, pressures to 50,000 psi, write Aldrich Pump Co., 8 Pine St., Allentown, Pa. You'll get a pump as tough as these because...

THE TOUGH PUMPING PROBLEMS GO TO

ALDRICH

SUBSIDIARY OF INGERSOLL-RAND

We put a lot of work into it — You get a lot of work out of it



Quality inside and outside

Here are two "close-ups" of Roebling Royal Blue Wire Rope which show in part where your savings come from . . . uniformity of structure. Invisible, but equally important, is Royal Blue's *extra* high tensile strength. All the way through, Royal Blue pays off for you on every kind of wire rope job. Find out more from your wire rope distributor, or write for free booklet to Roebling's Wire Rope Division, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation.

COMING EXHIBITS

Packaging Machinery Show—Nov. 7-10, Cobo Hall, Detroit. (Packaging Machinery Mfrs. Institute, 342 Madison Ave., New York 17.)

Marine Supplies & Equipment Show—Nov. 15-17, Hotel Roosevelt, New York City.

MEETINGS

OCTOBER

American Society of Tool Engineers — Semi-annual conference, Oct. 26-27, The Royal York Hotel, Toronto. Society headquarters, 10700 Puritan Ave., Detroit.

Industrial Truck Assn. — Annual meeting, Oct. 29-31, The Greenbrier, White Sulphur Springs, W. Va. Assn. headquarters, One Gateway Center, Pittsburgh.

Steel Service Center Institute—Board of directors meeting, Oct. 29-31, Seaview Country Club, Absecon, N. J. Institute headquarters, 540 Terminal Tower, Cleveland.

Material Handling Institute, Inc.—Annual meeting, Oct. 29-31, The Greenbrier, White Sulphur Springs, W. Va. Institute headquarters, No. 1 Gateway Center, Pittsburgh.

National Metal Trades Assn.—62nd convention, Oct. 31-Nov. 1, The Hotel Commodore, New York. Assn. headquarters, 222 West Adams St., Chicago.

NOVEMBER

National Assn. of Engineering Companies—Annual meeting, Nov. 2, Latin Quarter, Detroit. Assn. headquarters, 1800 Buhl Bldg., Detroit.

National Warm Air Heating and Air Conditioning Assn.—Annual convention, Nov. 6-10, La Salle Hotel, Chicago. Assn. headquarters, 640 Engineers Bldg., Cleveland.

Malleable Founders Society—12th annual market development confer-

(Continued on P. 26)

ROLLING MILL SUPT. reports:

Soffel's

EXOTHERMIC SIDEBOARDS

Increase Slab Yield 5 to 8%

...even more in our "out the door" products

"By increasing yield in the ingot with Soffel's Exothermic Sideboards, we increase our slab yield even more. By the time our finished products go out the door we have added substantially to our volume. Sure, we like Sideboards. They make plenty of dollars and sense to us."

PRODUCT ADVANTAGES

- Eliminate permanent and conventional hot tops.
- Easy, and single, stripping of Big End Down molds.
- Sideboards are easily placed in head of mold by one man — crane only necessary on very large ingots.
- Longer mold life — less mold cost — less mold inventory to carry.

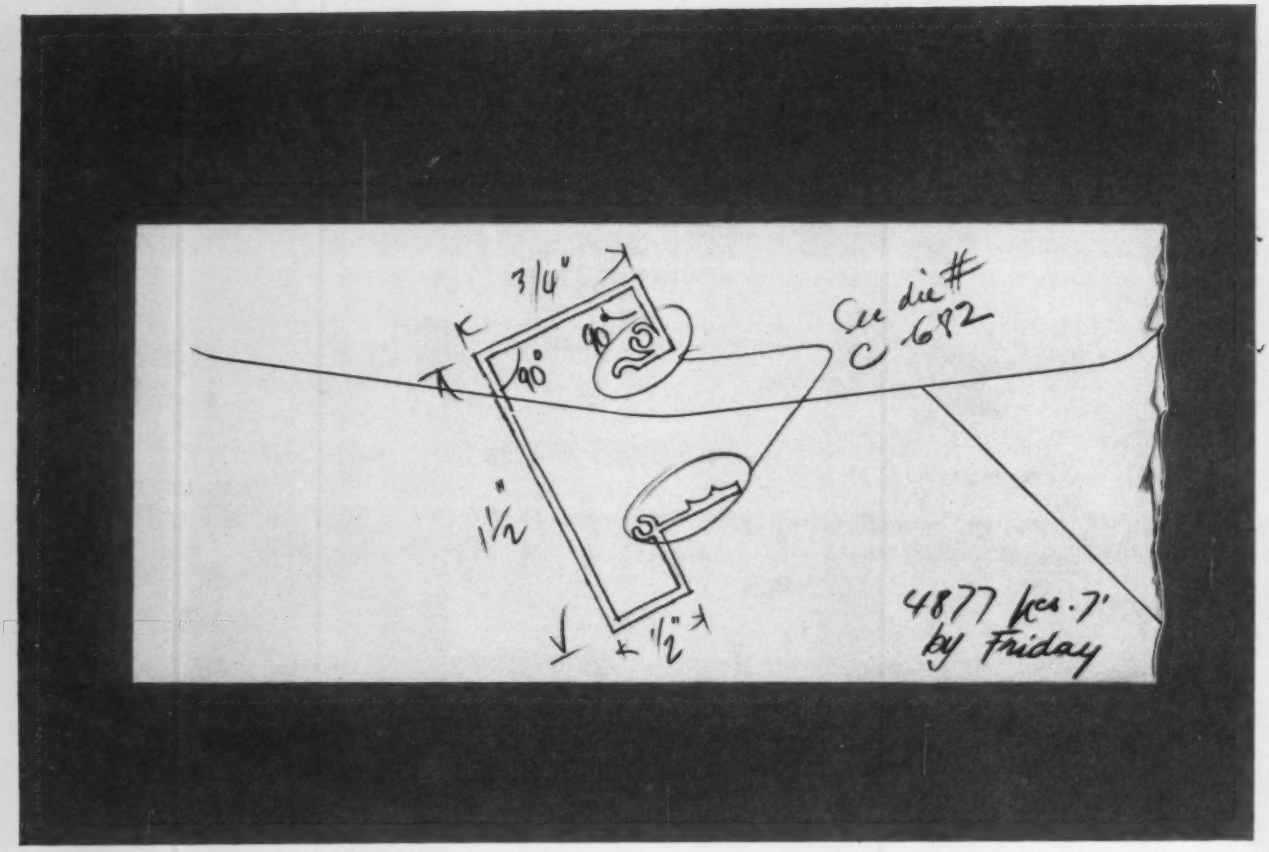
Soffel's Exothermic Sideboards increase ingot yield, assure top cut soundness and provide more ton steel out the door per ton of steel in the ingot.

Phone NAtional 5-1571

Pittsburgh Metals Purifying Co.

A Division of Treesdale Laboratories, Inc.

MARS, PENNSYLVANIA



ORDERED MONDAY

with specs on the back of an envelope

YOUR nearby aluminum extruder is geared to provide fast service. Your order doesn't have to be big to be important to him. It doesn't have to wait for hundreds of others. And when it comes from his presses, delivery is quick, because your plant is close to his.

Speed is just one reason, however, for dealing with an independent extruder. *Quality* is another—the consistent quality of a specialist—the consistent quality of a supplier who takes a personal interest in your business.

Service is equally important. Your independent extruder is at hand when you need him. And he has the know-how to analyze

ALUMINIUM LIMITED

ALUMINIUM LIMITED SALES, INC.
111 W. 50TH ST., NEW YORK 20, NEW YORK

DELIVERED FRIDAY

5000 high-quality aluminum extrusions

your product line and show whether aluminum extrusions can now replace any costlier parts or assemblies.

You'll find that it's good business to get acquainted with one of these extruder neighbors . . . specialists who are supplied with top-quality aluminum ingot by Aluminium Limited.

ALCAN

Supplying metal and ideas to companies that work with aluminum.

Mail this coupon for Extruder names and addresses:

Aluminium Limited Sales, Inc. Dept. IA-1026.
111 W. 50th St.
New York 20, N. Y.

Please send me a list of Independent Extruders in this area.

Name_____

Title_____

Company_____

Address_____

City_____ State_____

NOW!

Portland, Oregon Bulk Unloader Ready to Slash Import Costs

Portland Public Docks proudly announces completion of its giant new straight-line bulk unloader and pier—the only plant of its kind on the Pacific Coast! With a rated-capacity of 900 tons-an-hour, this facility cuts the heart out of dry bulk importing costs and puts the savings in your pocket.

- direct transfer from ship to rail or truck
- 140-car rail yard
- open storage area
- cargo shed
- will handle all types of vessels . . . all types of dry bulk cargoes

Specially designed to create savings for importers of ores, ore concentrates, chemicals, salts, feeds and all dry bulk cargoes.

FOR COMPLETE INFORMATION CONTACT:
SALES-TRAFFIC DEPARTMENT

PORTLAND
PUBLIC DOCKS

Operated by the Commission of Public Docks
3070 N.W. Front Ave. Portland 10, Oregon
CA 8-8231 Cable (DOCOM) TWX PD309U
EASTERN REPRESENTATIVE: Buckley & Co., 170 Broadway, New York 38, N.Y.

MEETINGS

(Continued from p. 23)

ence, Nov. 1-2-3, Hotel Sheraton-Cleveland, Cleveland. Society headquarters, 781 Union Commerce Bldg., Cleveland.

Steel Service Center Institute—Pacific regional meeting, Nov. 11-14, Del Monte Lodge, Pebble Beach, Calif. Institute headquarters, 540 Terminal Tower, Cleveland.

Air Conditioning & Refrigeration Institute — Annual meeting, Nov. 12-15, The Homestead, Hot Springs, Va. Institute headquarters, 60 East 42nd St., New York.

Steel Founders' Society of America—Technical and operating conference, Nov. 13-15, Hotel Carter, Cleveland. Society headquarters, 606 Terminal Tower, Cleveland.

National Electrical Manufacturers Assn.—Annual meeting, Nov. 13-17, Traymore Hotel, Atlantic City. Assn. headquarters, 155 E. 44th St., New York.

National Machine Tool Builders Assn.—Annual meeting, Nov. 14-16, Americana Hotel, Bal Harbour, Fla. Assn. headquarters, 2139 Wisconsin Ave., N. W., Washington, D. C.

National Foundry Assn.—63rd annual meeting, Nov. 15-17, Savoy-Hilton Hotel, New York. Assn. headquarters, 4321 St. Charles Rd., Bellwood, Ill.

American Society of Mechanical Engineers—Winter annual meeting, Nov. 26-Dec. 1, Statler-Hilton Hotel, New York. Society headquarters, 29 West 39th St., New York.

American Institute of Steel Construction—Annual meeting, Nov. 27-30, Boca Raton Hotel, Boca Raton, Fla. Institute headquarters, 101 Park Ave., New York.

DECEMBER

American Institute of Chemical Engineers—54th annual meeting, Dec. 3-6, Hotel Commodore, New York. Institute headquarters, 25 W. 45th St., New York.

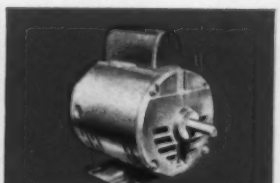
from machine tools to typewriters . . .

. . . Robbins & Myers motors power them all!

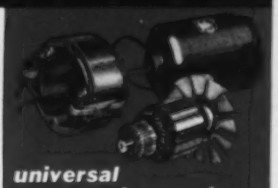
Each R&M motor, 1/200 through 200 HP, is electrically and mechanically designed with life-prolonging features which assure dependable operation, simplified installation and low maintenance. From rugged machine tools to complex business machines, there's an R&M motor for every job . . . Fractional and Integral H.P. Motors and Motor Parts in all popular mountings, electrical types and enclosures. Most are ready for off-the-shelf delivery. Others can be quickly produced. Should you require custom motors, R&M's experienced application engineers, aided by modern electronic computers, can furnish the one design best suited to your needs.

Write today for information, or send your powering problem to R&M. No obligation, of course!

integral motors, 1 thru 200 hp

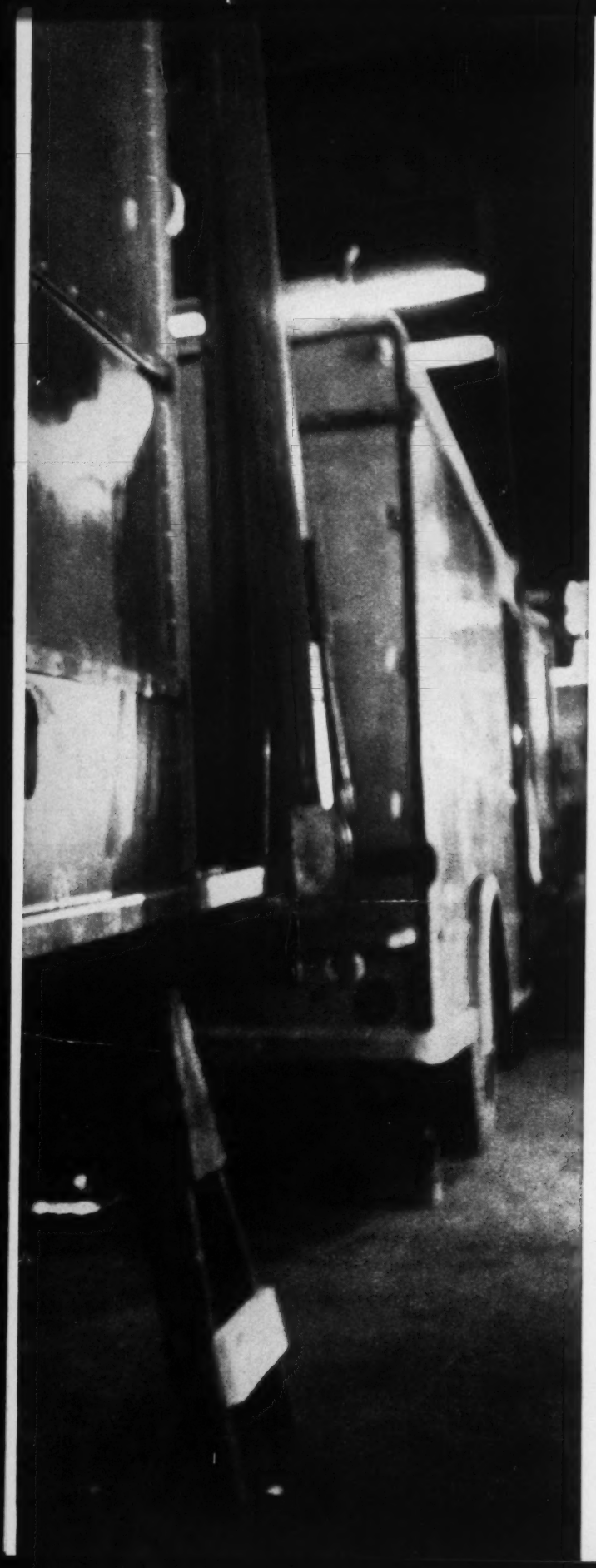

fractional motors, 1/200 to 1 hp

special application, 1/100 thru 1/3 hp


universal or series parts, 1/50 to 1/2 hp

ROBBINS & MYERS, INC., Springfield, Ohio

Fractional and Integral HP Electric Motors • Electric Hoists and Overhead Traveling Cranes • Moyno® Industrial Pumps
Propellair® Industrial Fans • R & M-Hunter Fans and Electric Heat • Trade-Wind Range Hoods and Ventilators
Subsidiary companies at: Memphis, Tenn., Pico Rivera, Calif., Brantford, Ontario.



HOW BOYERTOWN KEEPS EVERY BODY HAPPY

Boyertown Auto Body Works of Boyertown, Pennsylvania is keeping delivery truck owners, drivers and maintenance men especially happy these days by using a new, all-around material in its body construction: J&L Nickel-Copper-Titanium high-strength forming steel.

The owner is pleased because lighter weight means lower operating cost. And Boyertown has been able to save from 600 to 650 pounds over mild steel in a 12-foot forward control delivery body—with no sacrifice of strength!

The driver is satisfied because the increased ductility of J&L Nickel-Copper-Titanium makes it possible for Boyertown to design bodies with greater flexibility—provide more convenience and safety for the man behind the wheel.

The maintenance man is happiest of all. J&L Nickel-Copper-Titanium has a minimum of 4 times the corrosion resistance of mild steel. (For extra protection, Boyertown coats it with rust-inhibiting zinc chromate). It has greater abrasive and impact resistance, and less tendency to dent and wear.

When maintenance is necessary, dents can be easily "bumped out," and repairs are quick and inexpensive.

That's why Boyertown—a pioneer in the use of high-strength steel—continues to specify J&L Nickel-Copper-Titanium for its exterior and interior truck panels, posts, ribs, cross members, floors, doors and windshield assembly. Ask your J&L salesman about J&L's other new high-strength steels, JLX-W Columbium-Bearing and J&L "Cor-Ten."

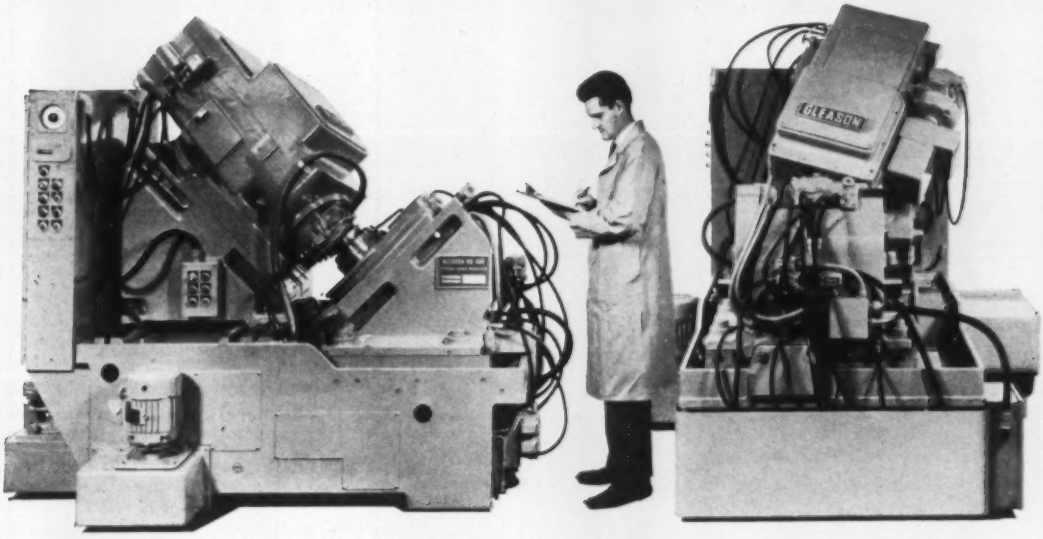
Jones & Laughlin Steel Corporation
3 Gateway Center, Pittsburgh 30, Pennsylvania

J&L STEEL

GLEASON NO 60
HYPOID HELIXFORM

...PRODUCES QUIET, ACCURATE GEARS, UP TO 50% FASTER... AND SAVES FLOOR SPACE. These new Gleason "inclined-spindle" Hypoid Gear Cutting machines are primarily designed for faster, more accurate roughing and finishing of automotive main drive gears up to 10½" O.D. ■ Unique "inclined-spindle" design provides greater rigidity for precision cutting. ■ New type cutters, faster index and work clamp arrangements combine with automatic loaders to increase production up to 50%. ■ Yet, these new machines occupy 35% less floor space than previous machines. ■ Set-up and operation are simplified . . . only four summary settings with simple gage bars to relate work and cutter. Any number of machines can be set-up with the same gage bars to produce identical gears . . . no expensive set-up fixtures needed. ■ New magnetic chip removal and coolant systems assure constant forced flow of clean oil over the work . . . help prolong cutter life, eliminate periodic cleaning, and minimize coolant loss. ■ For information on these all-new machines write Gleason Works, 1000 University Avenue, Rochester 3, New York.

A BRAND NEW ANGLE IN GEAR CUTTING . . .



NEW GLEASON No. 606 Hypoid Gear Rougher

NEW GLEASON No. 607 Hypoid Helixform Gear Finisher

GLEASON

Cosco Stools, Tables, Carts are . . .

"Made Like A Million" with Pittsburgh Steel Sheet

Make your products "like a million" and you'll sell them by the million.

That's the philosophy practiced at Hamilton Cosco, Inc. of Columbus, Indiana, manufacturer of nationally known Cosco brand tubular steel frame household and juvenile products and office chairs.

And the philosophy has paid off.

Introduced 16 years ago, Cosco household stools have averaged nearly a million units a year. Their success led to development of other popular Cosco products ranging from baby jumpers to executive office chairs.

Pittsburgh Steel Company plays an important part in Hamilton's success by supplying substantial quantities of cold rolled sheet that consistently meet Cosco's ultra-critical requirements.

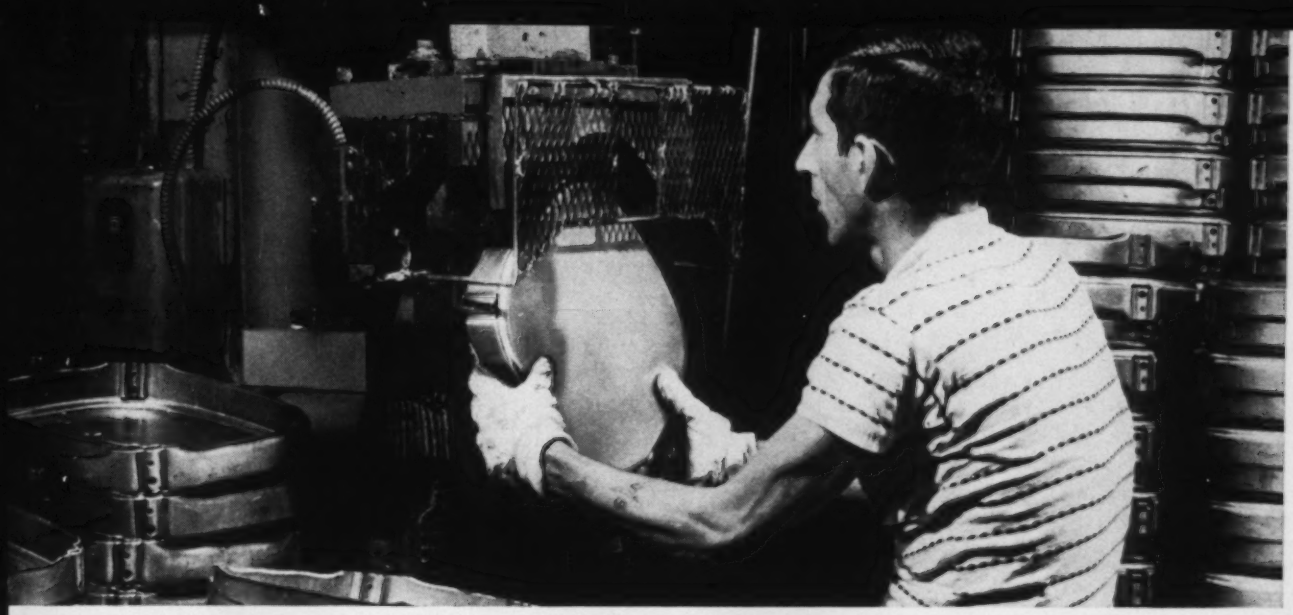
For, at Hamilton there's no such thing as a "second" in a finished product, be it serving cart or stool, playpen or folding bridge chair. The slightest imperfection — in forming, bending, painting or plating — requires reprocessing or scrapping of the defective item.

Supplying cold rolled sheet that faithfully meets such air-tight quality control places unusual responsibility on the steel supplier.

But, Pittsburgh Steel regularly meets this obligation with sheet known throughout the metalworking industry for its three "F" qualities:

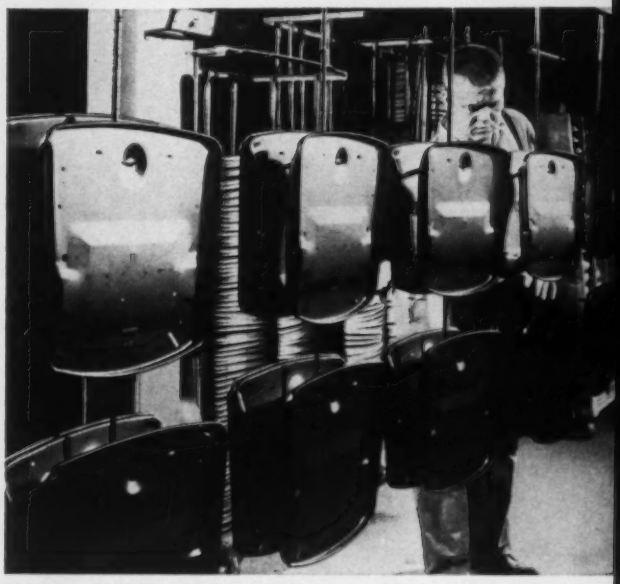
- **Flatness** — for exposed surfaces where appearance is vital and for fast production on automatic and semi-automatic equipment.
- **Finish** — dense, exceptionally clean surface for critical finishing operations, particularly Hamilton's electrostatic painting process.
- **Formability** — for precise uniformity in stamped, drawn, rolled or bent shapes; and especially for non-fluting characteristics in difficult bends on electric-welded tubing rolled

The three "F" features of Pittsburgh Steel sheet—**flatness, finish, formability**—show up in assembly of the popular Cosco "Hour Glass" step stool. Gleaming backrests, gracefully curved tubular legs and brackets, seat pans and fold-away steps, all reflect quality of Pittsburgh cold finished sheet.



Flatness of Pittsburgh cold rolled sheet is critical for appearance, rigidity of stool seat and for trouble-free production in long runs. Here, after forming and piercing, raw edges are turned under.

Formability of Pittsburgh Steel sheet is demonstrated here as ¾ inch tubing, rolled from slit sheet, takes severe bends and deformation required for backrest brackets. Non-fluting quality of steel on radius of bends is vital on this and all other tubular parts produced by Hamilton Cosco, Inc.



Finish of Pittsburgh Steel sheet provides dense, exceptionally clean surface for tight, smooth paint adherence required by Hamilton's electrostatic painting process. Seat pans for Cosco's unique gatefold card table chairs show painting quality of steel.

from Pittsburgh Steel sheet.

H. E. Spurgeon, purchasing agent, said:

"The company's success is based on its insistence on absolute quality of its products—and that means quality starting with raw steel. We do many things merely because it's the best way.

"Performance of Pittsburgh sheet is very good, we've found. Over-all, I'd say Pittsburgh Steel is a very satisfactory supplier."

Pittsburgh Steel Company sheet—the steel with the three "F" qualities—can help step up your product quality, too, whether you're using hot rolled or cold rolled, sheet widths or strip widths. Contact one of the Pittsburgh Steel Company District Offices listed here. We'll match the steel to your product.

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

Atlanta	Cleveland	Dayton	Los Angeles	Pittsburgh
Chicago	Dallas	Detroit	New York	Tulsa
		Houston	Philadelphia	Warren, Ohio

Steel

Lincoln Electric's plan for...

COMPLETE WELDER REMANUFACTURING...

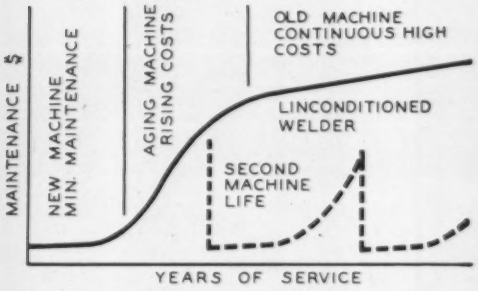
Machines returned to the plant for remanufacturing are completely torn down and rebuilt with new parts where needed. All work is done at published prices known beforehand. Owner receives new machine guarantee on completion of the work.

. . . REDUCES CAPITAL INVESTMENT, PRESERVES PROFITS

If you own Lincoln welding equipment, you know it traditionally outlasts other makes. Routine maintenance is all that's needed to keep it in top operating condition. But any machine reaches a point where mounting repair costs indicate the need for a complete overhaul. Lincoln provides a complete factory remanufacturing service for owners of Lincoln equipment. It's called Linconditioning. Because Linconditioned welders carry a new machine guarantee, effective life of your welder is extended 100% at about half the cost of a new machine. This kind of service, we believe, helps Lincoln customers battle indirect costs, preserve hard-to-keep profits.

Your welder is disassembled right in the Lincoln plant by trained factory mechanics; then completely overhauled and remanufactured. Parts are restored to like-new condition. Those beyond repair are replaced with the same new parts which go into brand-new machines. Here, frames from generator-type machines are vapor-degreased. Dirt and dust is removed from the coils which are then tested for grounds, shorts and electrical balance. Each must test out like new before assembly.

Gas and diesel engines for portable welders are thoroughly reconditioned, too. Blocks are cleaned, inspected for cracks, sizes and general condition. Cylinders are re-bored, honed to proper oversize and finish. Valves and crankshafts, checked for wear, are reground and buffed. New piston rings are precision-fitted to bore size. After re-assembly, engine is idle-run to wear in.

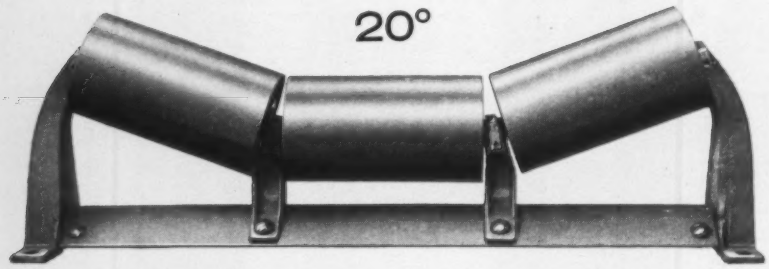


Here's a graphic expression of Linconditioning. When a machine is new, it requires little if any maintenance. As it ages, the occasional service it needs can be obtained from your local Lincoln field service shop. But eventually, the frequency of repairs causes constant expense. At this point, Linconditioning restores your machine to new condition, doubles its effective service life . . . all at a price varying from 40-50% of the cost of a new machine. Find out more about this money-saving remanufacturing plan now. Contact your local Lincoln field engineer. Or, write for bulletin 9100.1.

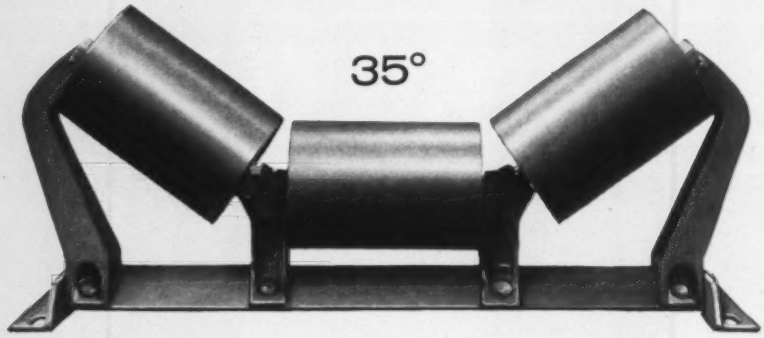
THE LINCOLN ELECTRIC COMPANY • DEPT. 1961 • CLEVELAND 17, OHIO

LINCOLN WELDERS

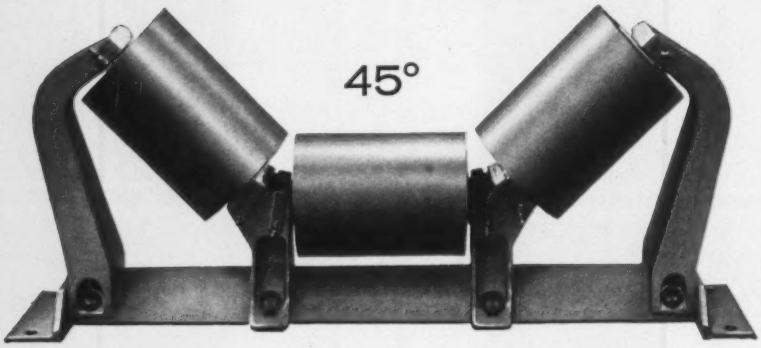
THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT AND ELECTRODES



which PERMASEAL® idler



is best for your job?



There's a PERMASEAL Idler to perfectly match your belt conveyor requirements. A broad line, plus skilled engineering help, enables you to select the idler that exactly meets your needs. No need to over- or under-design. Power requirements are minimized. Double, flexible diaphragm seals keep grease in the rolls, dirt out. Protect bearings for years. Accurate roll alignment and rugged construction provide long maintenance-free life for idlers, as well as conveyor belts.

PERMASEAL Medium Duty Idlers are available with end rolls inclined at 20°, 35° and 45°; Heavy Duty Idlers at 20° and 35°. In addition to the standard troughing idlers shown here, the PERMASEAL line includes Picking Belt Idlers, Impact Absorption Troughing Idlers, Flat Belt Carrying Idlers and Return Idlers—all types and sizes, for general and extra-heavy duty service. PERMASEAL Idlers handle belt widths up to 72".

Call your nearest Jeffrey distributor, or write for Belt Idler Catalog 996. The Jeffrey Manufacturing Company, 925 North Fourth St., Columbus 16, Ohio.

JEFFREY

If it's conveyed, processed or mined, it's a job for Jeffrey

Higher strength steels make more sense for this rugged, lightweight trailer

(It carries 1100 pounds more)—Here is a high-capacity dump body trailer that gives you a substantial dead weight reduction for only a few cents per pound of payload increase!

This trailer, which went into service in January, 1961, hauling both hot and cold slag, is proof that each pound of payload increase you buy can cost as little as 35¢ per pound.

To prove our point, this 27-cubic-yard trailer was created by the TEC Division of the Heil Company, Cleveland, Ohio, in conjunction with the Applied Research Laboratory of United States Steel. Using the USS Family of Steels—carbon steel, USS COR-TEN High-Strength Low-Alloy Steel (50,000 psi minimum yield point) and USS "T-1" Constructional Alloy Steel (100,000 psi minimum yield strength)—compared to a similar capacity carbon steel trailer, we were able to reduce the weight of this one by 1100 pounds—at a cost of only *35¢ for each one of the 1100 pounds.*

This was done by using 14-gage USS COR-TEN Steel for the trailer body sides, 12-gage in the floor, and USS "T-1" Steel in the high-strength draft arms.

As a bonus, both USS COR-TEN and "T-1" Steels give you four to six times the atmospheric corrosion resistance of carbon steel. You also get high resistance to abrasion and impact. USS COR-TEN holds paints considerably longer than carbon steel.

In other words, pound for pound, higher-strength steels have yet to be equaled by any other material when you consider strength, endurance and cost.

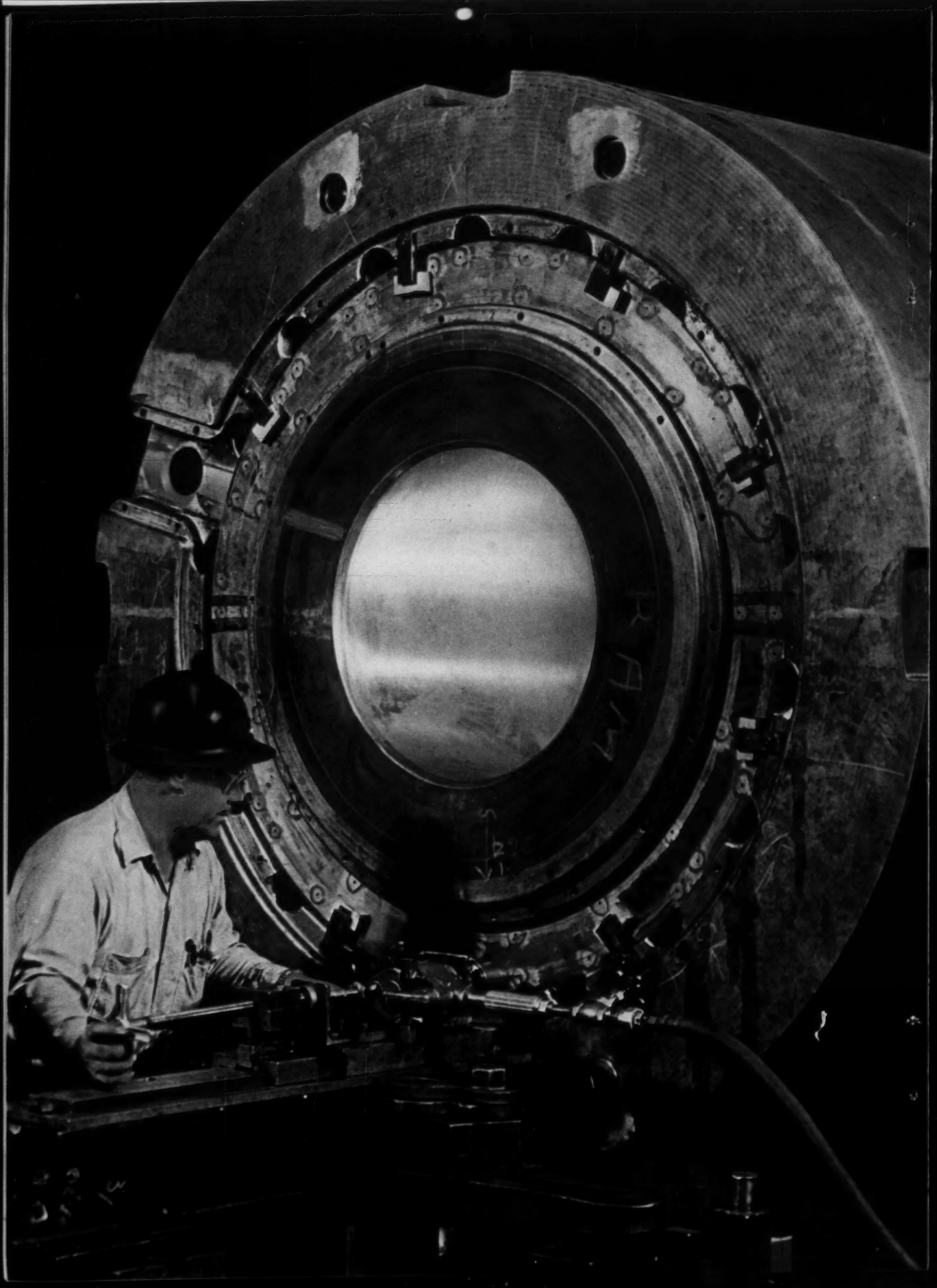
The tremendous success of this model has led to the design of a similar steel trailer that will lop off still another 400 pounds of dead weight (9100 lbs. tare). For more information about USS "T-1" Constructional Alloy or our various grades of high strength steels, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS, COR-TEN and "T-1" are registered trademarks.

United States Steel Corporation • Columbia-Geneva Steel Division • National Tube Division • Tennessee Coal and Iron Division • United States Steel Supply Division • United States Steel Export Company

United States Steel

This mark tells you a product is made of modern, dependable Steel.

This new frameless steel trailer built with USS COR-TEN and "T-1" Steels easily withstood a punishing seven-month service test hauling 23,000 tons of hot and cold slag and is ready for several more years of gruelling work. Operator: Hawkins Contracting Company, Pittsburgh, Pennsylvania.



This mark tells you a product is made of modern, dependable Steel

Extrusion Press Gets Billet-Proof USS Forged Jacket

Only a forging provides the ultimate combination of strength, toughness and soundness needed for an extrusion press container assembly like this one for the Dow Metal Products Company Division of the Dow Chemical Company. This two-piece USS Quality Forged assembly, in use in "Dow's" 14,000-ton-capacity horizontal extrusion press, withstands tremendous forces exerted by the ram during extrusion of magnesium and other nonferrous shapes at temperatures up to 900°F.

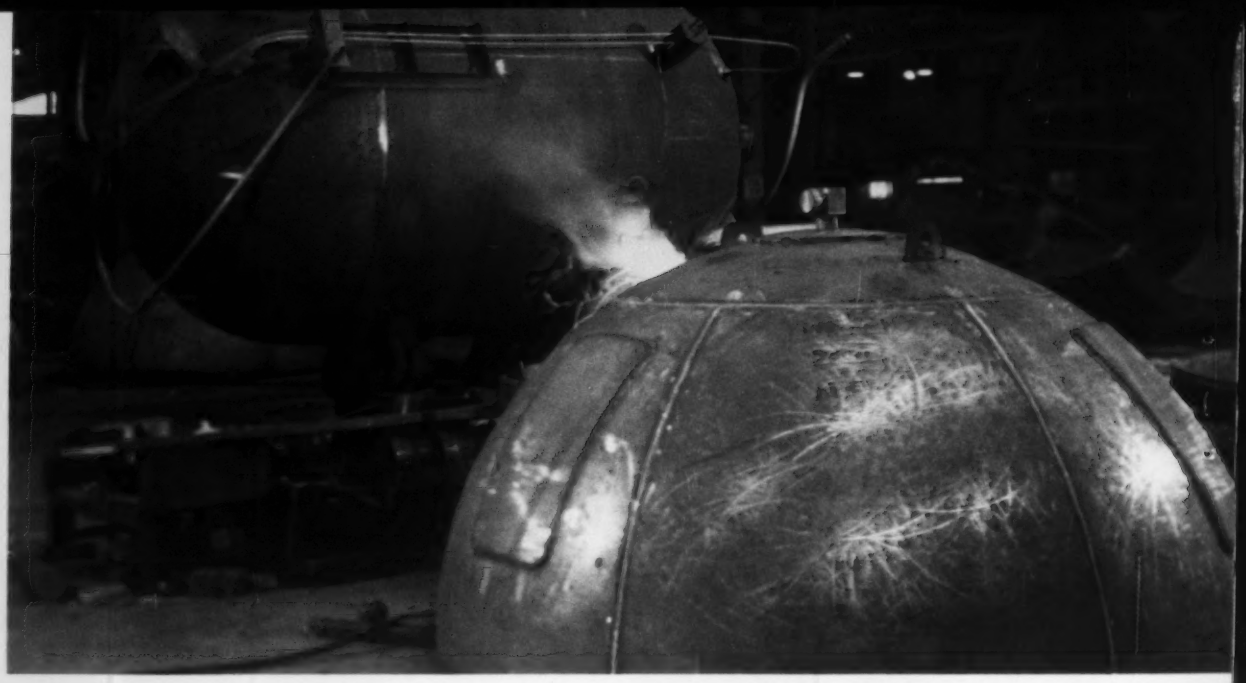
The photograph at the left shows the massiveness of the 40-ton alloy steel container jacket (viewed from the ram end) and its smaller, 8-ton tool-steel "liner" that measures 40¾" OD x 25⅛" ID x 75" long. Although what you see in the photograph looks like one piece of steel, it's actually two: one large sleeve (the container jacket) "shrink-fitted" over a smaller, bored cylinder (the "liner"). However, the most important aspects cannot be photographed.

Forgings for applications such as this one must start with the highest quality electric furnace ingots, be expertly forged, and then receive skillful heat-treating and very accurate machining. The eighteen 3½"-diameter electric heater holes (partially obscured by a circular cover plate) drilled completely through the 75" length of the hardened container jacket, and the careful shrinking of the jacket over the liner, are only two such examples of the precision work we have in mind.

This same careful attention to detail will be applied to your order by all the men in our Forgings Division. United States Steel produces Quality Forgings for such applications as drop hammer and press parts, rolls and sleeves, turbine and generator rotors, propulsion and shipshafting, and miscellaneous medium and heavy forgings. For more information, contact our nearest district sales office or write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS is a registered trademark.

United States Steel Corporation • Columbia-Geneva Steel Division • Tennessee Coal and Iron Division
United States Steel Export Company

USS United States Steel



USS 9% Nickel Steel reduces cost of handling cryogenic liquids

More than 400 vessels of 9% nickel steel have been put to use storing liquids at temperatures down to −320°F. The hemispherical heads shown being fabricated here are designed for liquid oxygen storage at −297°F. Some of these ASME Code designed and stamped vessels were fabricated of USS 9% Nickel Steel at Pittsburgh-Des Moines Steel Company for use by Air Reduction Company, Inc., New York.

The vessels are 9 feet in diameter and 16 feet in overall length including the heads. They will operate at a normal design pressure of 270 psi. Plate thicknesses are 0.700″ in shell plates and 0.375″ and 0.350″ in head segments. Tanks were stress-relieved after welding.

Low carbon, 9% nickel alloy steel was developed to provide a ductile, moderately priced steel for storing such cryogenic liquids as ethylene, methane, oxygen and nitrogen in the range from −150°F to −320°F.

USS 9% Nickel Steel maintains good strength, toughness, and excellent ductility at sub-zero temperatures down to −320°F. At room temperature it has a minimum yield strength of 65,000 psi and high charpy impact values, while at −320°F, double-normalized and tempered 9% nickel steel shows a 36% increase in yield strength, and charpy keyhole impact values range from 20 to 40 ft/lbs. Since tensile properties and impact values are even better for quenched and tempered 9% nickel steel, recognition by various code groups of the suitability of such treatment is now being considered.

10% lower costs. Accumulated data on cryogenic vessels of 9% nickel steel suggest that minimum savings of 10% of the final erected costs can be expected from advantages in welding and fabrication alone, in comparison with non-ferrous metals. Economies due to higher strength are also possible. An allowable ASME working stress of up to 23,750 psi permits reduction in vessel weight with lower unit costs.

Acceptance of 9% nickel steel in the as-welded condition by code and regulatory bodies would make this steel even more attractive to designers and fabricators since the vessel would cost less to produce without stress-relieving, and would be less expensive.

Results of "Operation Cryogenics."

Impact tests conducted late in 1960 on three full-size rectangular vessels in the as-welded condition (not stress relieved) proved they could withstand impacts far beyond any likely to occur in service. Burst tests on six cylindrical vessels, also at −320°F, showed that burst pressure for the three as-welded vessels (not stress relieved) averaged higher than that of the three stress-relieved vessels. Burst pressure for all six vessels was at least four times the design pressure. These tests proved that 9% nickel steel has the high strength, low temperature toughness, and weldability needed for cryogenic pressure vessels.

For the complete story of USS 9% Nickel Steel, including all the details of "Operation Cryogenics," write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

United States Steel Corporation · Columbia-Geneva Steel Division · National Tube Division · Tennessee Coal and Iron Division · United States Steel Supply Division · United States Steel Export Company

USS United States Steel

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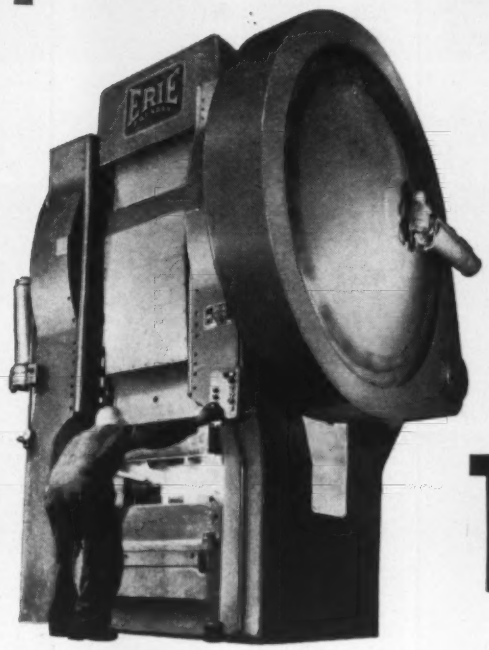
For maximum strength . . . toughness . . . safety

WANT TO AUTOMATE YOUR FORGING OPERATION?

You set your production goal . . .



ERIE WILL BUILD THE PRESS

That's how the AmForge division of American Brake Shoe Company, Chicago, more than doubled their previous production of track links for crawler tractors: they set their production goal —then installed a 2,500 ton Erie automated mechanical forging press as part of a comprehensive forging complex. Present production exceeds 600 forgings per hour . . . with ultimate output scheduled to reach 1200 per hour.

A single Erie-built automated press, with only one operator-observer, can substantially increase your present production rate and equal the output of several regular forging presses and a number of production men.

To meet your specific needs Erie Foundry, the first company to automate forging, will design a machine for the high volume production of such parts as connecting rods, gear blanks, valves, pinions or wheel hubs. For Erie specializes in custom-designing and building automated presses in capacities up to 8,000 tons.

For the complete story, including details on the AmForge installation, write Erie Foundry Company, Erie, Pa.

ERIE

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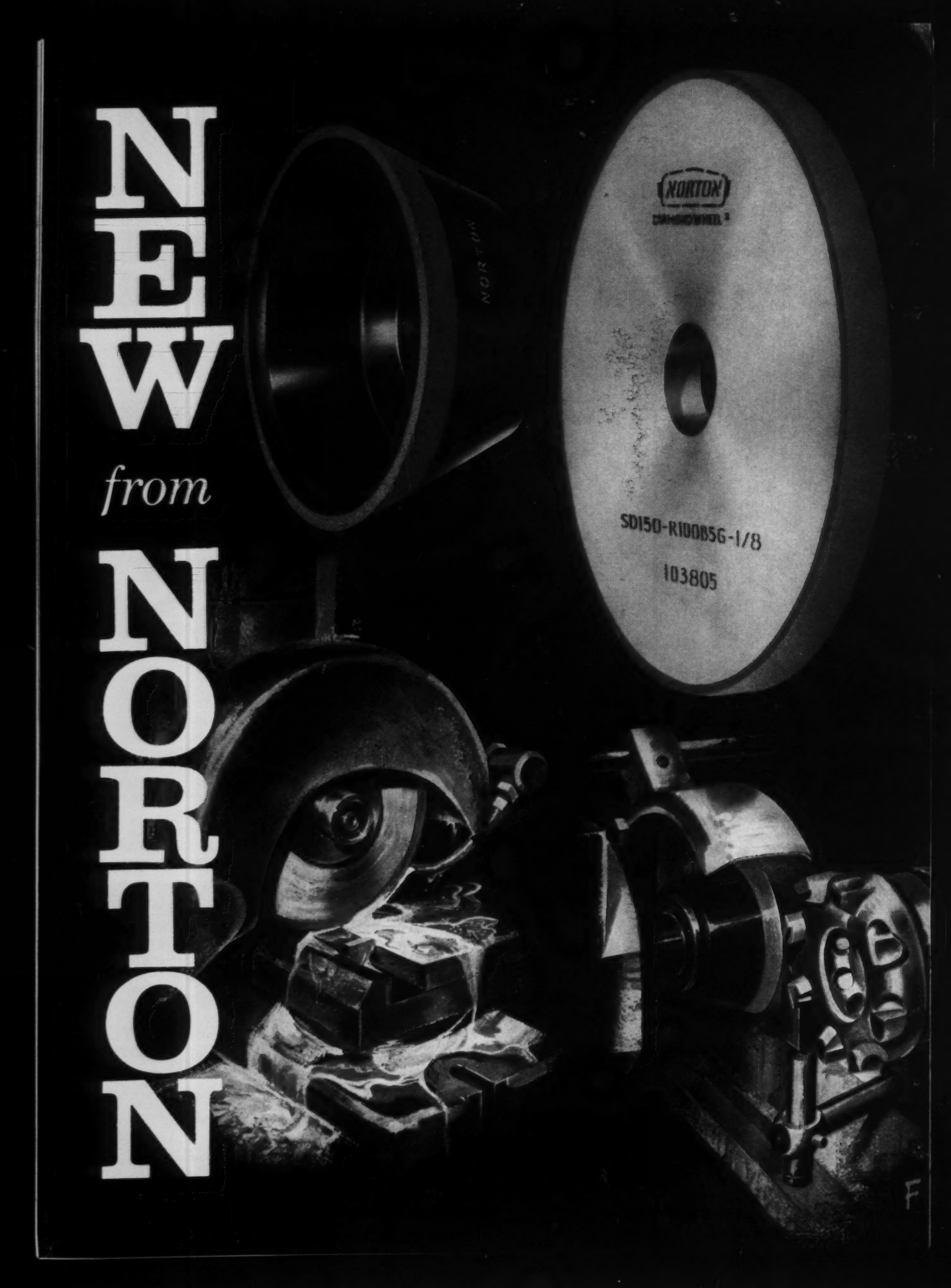
ONE OF THE GREAT NAMES IN FORGING

Manufacturers of Forging Hammers • Forging Presses • Hydraulic Presses • Trimming Presses

EF-61-02

J-8082

NEW *from* NORTON



THE DIA-CROWN LINE...

with the first really new bond in all diamond wheel history!

...B-56, an unparalleled advancement for all carbide grinding ...wet and dry

Since Norton Company developed the first diamond wheels for industry in 1929 it has been the leader in diamond wheel progress — first the resinoid bond, then the metal and vitrified bonds.

Now comes another "first" from Norton, a brand-new bond, the B-56, an outstanding development combining greater productivity and economy for either wet or dry carbide grinding in ONE bond — providing the finest diamond wheels, the Dia-Crown line, ever produced for tool sharpening, die grinding and all other carbide toolroom or production jobs.

In test after test on the widest range of carbide grinding, wet and dry, in customers' plants, Norton Dia-Crown B-56 wheels have outperformed all other wheels with major results — per job — including the following:

- Increased volume of carbide removed, per unit of time.
- Longer wheel life without sacrificing speed of cut.
- More workpieces handled per wheel.
- Considerably lower wheel cost per cubic inch of carbide removed.

Believable? . . . It sure is! Look at these quotes from customer reports!

"*Wheel was so good we could hardly believe it, and checked test results again . . . still showed 30% longer wheel life.*"

"*This wheel reduced grinding costs from 13¢ to 7¢ per tip.*"

"*An extremely fine wheel. Cuts more carbide in a given time than any other wheel.*"

"*Best wheel ever used. Will convert to this for all our diamond wheel operations.*"

That's what our customers say — and it's due to this entirely new Norton resinoid bond — a truly outstanding development. Norton Dia-Crown wheels with this new bond are available in all types and sizes for carbide grinding. Remember, too, that if two wheels of the same size and type have been required for wet and dry grinding — this ONE new wheel will now do both — wet *or* dry, reducing inventories and cutting costs.

Get complete facts on how this new Dia-Crown line of diamond wheels can improve your carbide grinding and save you time and money. See your Norton Man, a trained Abrasive Specialist, or your Norton Distributor. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

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What good steel rolls are made of

Proper ingredients, modern facilities, experienced people and quality control . . . this is what steel rolls are made of at National Roll. They start with the careful selection of the correct steel analysis to suit your application. Then, men like Works Manager Jack Russell, pictured above, carefully control the quality of your rolls from electric furnace melt to turning and grinding. Why not see for yourself what good rolls are made of at National—whether steel, iron or nodular iron. A look at our facilities and a talk with our people will show you why . . . NATIONAL'S THE GROWING NAME IN ROLLS.

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GENERAL STEEL INDUSTRIES, INC., Avonmore, Pennsylvania
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NEW UNIBRITE STAINLESS STEEL STRIP
The only mill buffed strip!
Developed and perfected by Universal-Cyclops.
Both sides mirror bright, extra corrosion resistant.
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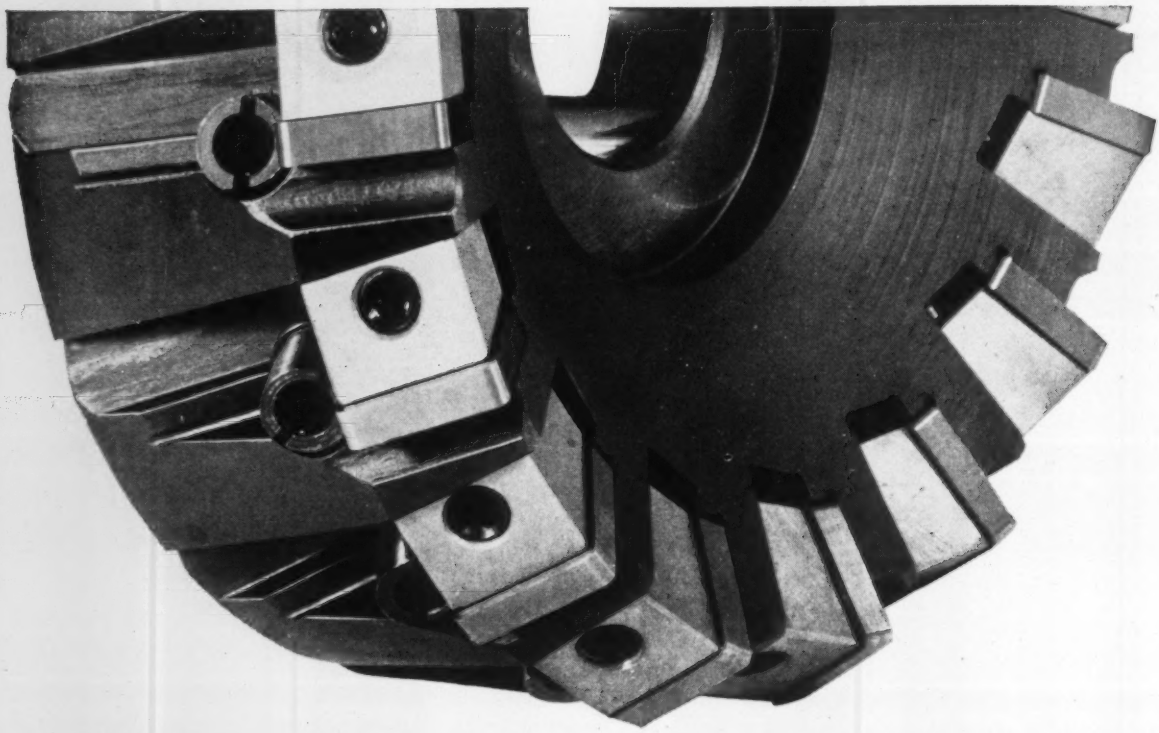


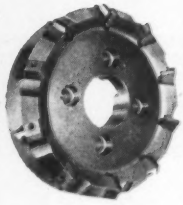
Here's the new, broader line of

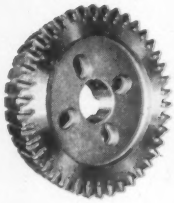
V-R MILLING CUTTERS

V-R Throw-Away Insert Milling Cutters bring the economies of "throw-aways" to your milling operations — provide lowest cost per edge for all roughing, semi-finishing and finishing cuts on light, medium and heavy duty cast iron, steel and nonferrous metals.

V-R "Rigidcut" Milling Cutters, with inserted blades, are available in two basic cone-type designs — fine pitch for high speed, fast feed milling and coarse pitch for light or medium feed and speed combinations.

V-R "Varicut" Milling Cutters, with inserted blades, give you 4-way interchangeability for plain milling, full side milling, half side milling and staggered tooth milling.





Many exclusive V-R Milling Cutter features combine for outstanding production ability. V-R throw-away inserts and inserted blades are available in a wide choice of quality carbide grades. Catalogs 6103 and 6104 show the complete, new V-R Milling Cutter line. Ask your V-R man or write for your copies today.

VASCOLOY-RAMET CORPORATION
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FM-866

You cannot afford to ignore the New Allen-Bradley BULLETIN 709 Starter Line

SIZE 00
1½ HP, 220 V
2 HP, 440-550 V

SIZE 0
3 HP, 220 V
5 HP, 440-550 V

SIZE 1
7½ HP, 220 V
10 HP, 440-550 V

SIZE 2
15 HP, 220 V
25 HP, 440-550 V

SIZE 3
30 HP, 220 V
50 HP, 440-550 V

SIZE 4
50 HP, 220 V
100 HP, 440-550 V

SIZE 5
100 HP, 220 V
200 HP, 440-550 V

They OUTPERFORM and OUTLAST ALL Others

These new Allen-Bradley starters bring you the greatest advance in reliability and life in all motor control history. Also, they possess a compactness that's almost unbelievable—especially in the higher ratings.

The new Bulletin 709 solenoid starters feature a patented, high-efficiency magnet, which is cushioned to reduce shock and wear. Contacts are of weld-resistant cadmium oxide silver. All coils are "pressure molded" for protection against physical damage and destructive atmospheres. The two or three solderpot overload relays are trip-free and tamperproof. Brooks Stevens, famous industrial designer, has given the new enclosures a styling that adds "eye appeal" to every installation. To get full details, contained in Publication 6100, please write today to: Allen-Bradley Co., 1316 S. Second Street, Milwaukee 4, Wisconsin.

SIZE 00 NOW AVAILABLE

Provides the same long life and reliability as others in the Bulletin 709 family. Rated 1½ HP, 220 V; 2 HP, 440-550 V.

15-G1-MR

ALLEN-BRADLEY
Member of NEMA

QUALITY MOTOR CONTROL

Here Your Motor Starter Dollar Buys

MORE OF THE QUALITIES YOU NEED

BULLETIN 709 SIZE 3
across-the-line solenoid starter in Nema Type 1 enclosure.

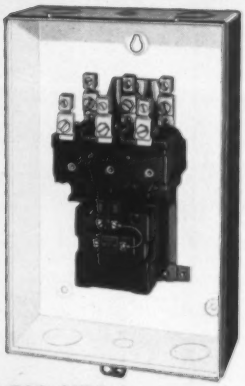
Where else could you possibly obtain—in one complete line—all of the desirable features of the ideal motor control...

1. **Smaller size**
2. **Greater reliability**
3. **Remarkable switching capacity**
4. **Longer life**
5. **Conscientious overload protection**
6. **Simpler installation**
7. **Complete accessibility**
8. **Beautiful appearance—either open or enclosed**
9. **Surprising light weight**

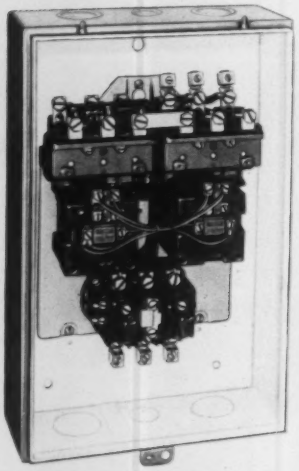
The heart of this new line of magnetic motor starters is the unique solenoid contactor. While it retains the famous A-B one-moving-part principle, it is completely new and far more efficient. This fact is reflected in reduced dimensions for all of these controls. Yet, this contactor design will perform reliably for many more *millions* of trouble free operations.

The new enclosures are very "eye appealing." When the open type starters are assembled into special panels, their neatness and compactness will delight the designers. Full details are in Publication 6100. Please write: Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

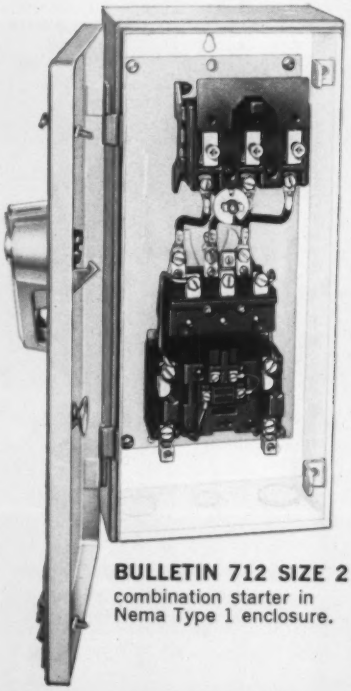
A-B QUALITY



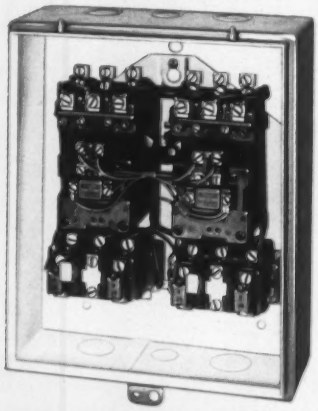
BULLETIN 702 SIZE 3
three-pole, a-c solenoid contactor in Nema Type 1 enclosure.



BULLETIN 705 SIZE 2
across-the-line reversing starter and overload relays in Nema Type 1 enclosure.



BULLETIN 712 SIZE 2
combination starter in Nema Type 1 enclosure.



BULLETIN 715 SIZE 1
across-the-line, two-speed starter—with two overload relays per speed—in Nema Type 1 enclosure.

15-61-MR

ALLEN-BRADLEY

Member of NEMA

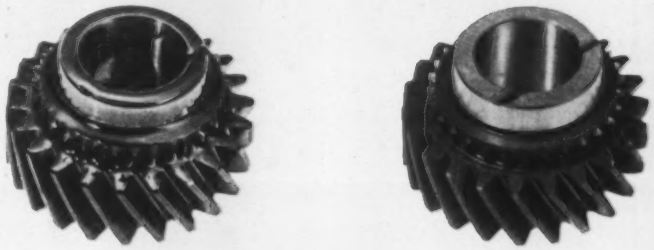
QUALITY MOTOR CONTROL

Water-soluble cleaners make safe, efficient replacements for solvents

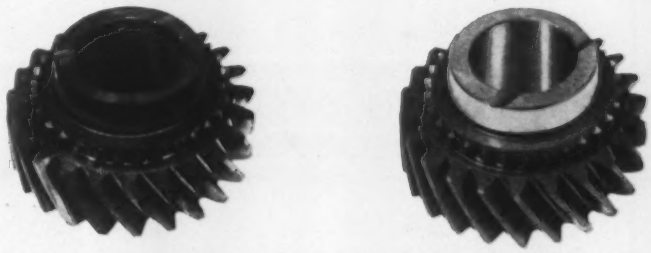
Many of the metal cleaning jobs which have been done with petroleum solvents can now be done as efficiently—if not more so—with the new high detergent cleaners now available. Though solvents are highly effective in the removal of mineral or vegetable oil deposits, they are ineffective on inorganic residues. They are also highly flammable and extreme precautions must be taken to prevent the fluids or fumes from ignition.

Another of the precautions necessary with many solvent type cleaners is protecting workers from the toxic vapors. Open tank equipment must be kept covered when not in use.

Immediately after parts are cleaned with these solvents, a rust preventive must be applied since they provide no protection and corrosion will occur in a few hours even in a moderately dry atmosphere.



Finish machined gear before and after immersion in Cerfa-Kleen CST.



Heat treated gear before and after cleaning in Cerfa-Kleen HPW.

Detergent cleaners for machining

It has been common practice for machine tool operators to have a pan of cleaner handy to permit cleaning of parts for checking purposes. This function can be performed by a water-soluble, highly detergent cleaner such as Houghton's Cerfa-Kleen CST. To provide efficient dip cleaning, only 6 to 12 ozs. per gallon of water are required. Toxicity and fire hazard are eliminated and both organic and inorganic soil are efficiently removed.

For power washer cleaning of machined parts, a cleaner such as Cerfa-Kleen HPW is remarkably effective. This mildly alkaline compound works best at temperatures between 150°F. and 185°F. and at concentrations of only ½ oz. to 2 ozs. per gallon of water. Fire danger and toxicity are overcome and a built-in rust preventive provides adequate protection between operations.

Cleaning after heat treating

Because of the efficiency of the new high detergent-alkaline cleaners, the inorganic soil deposited on parts in the heat treating process can be easily removed and rust protection provided in one operation. Here again, a product such as Cerfa-Kleen HPW will do an outstanding job. Through a powerful bi-phase detergent action and mild alkaline action, this product provides the ultimate in cleaning efficiency.

Years of experience by Houghton in the cleaning problems of the metalworking industry has led to the development of the four new Cerfa-Kleens. These four fill the needs of the great majority of plant operations. For detailed information, call your nearby Houghton Man or write E. F. Houghton & Co., 303 W. Lehigh Avenue, Phila. 33, Pa.

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INDUSTRY'S PARTNER IN PRODUCTION

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FIVE-DEEP

Unmatched facilities nearby

help you profit with UCM's "FIVE-DEEP" Ferroalloys

1 Unmatched Facilities for production and fast delivery of Union Carbide Metals' FIVE-DEEP alloys insure uninterrupted production at your metal-producing plant!

Six plants—3 with their own power facilities—and 17 warehouses, all located for fast shipments by rail, truck, or water.

These unmatched facilities are just one of the 5 intangible but ever-present extra values of FIVE-DEEP alloys. The others:

2 Strictest Quality Control — with over 100,000 tests per month from mines to shipment—makes sure you always get alloys of uniform size and analysis, with minimum fines, lot after lot.

3 Technology — many million dollars worth a year—helps you produce better, more profitable metals. UCM's 600-man research and development center is the birthplace of hundreds of new alloys.

4 Global Ore Sources assure you uninterrupted supplies of ferroalloys. UCM's close association with world-wide mines provides dependable raw material sources.

5 Customer Service brings you our integrated experience in the application of ferroalloys to various melting practices. Engineers from 9 UCM field offices travel a million miles a year to provide on-the-scene assistance.

For better metals, production economies, bigger profits, insist on UCM's FIVE-DEEP alloys. Union Carbide Metals Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y., producer of "Electromet" brand metallurgical products.

"Union Carbide" and "Electromet" are registered trade marks of Union Carbide Corporation.

UNION CARBIDE METALS

Only **ELECTROMET** ferroalloys from **UCM** are so deep in extra values to help you.

Metalworking Newsfront 6

SHIFTING MARKETS IN AUTOS pose flexibility problem in manufacturing, says C. H. Patterson, Ford Motor Co., vice president, basic manufacturing group. One route to improved flexibility, he points out, is reduction of non-essential differences among car lines. Another: Machine tools "adaptable to change."

REPLACEMENT RATES FOR APPLIANCES are under study by the Household Economics Research Div. of the U. S. Dept. of Agriculture. The agency finds that people hold on to their refrigerators for 16 years, their gas and electric ranges for the same time. TV sets are used for 11 years.

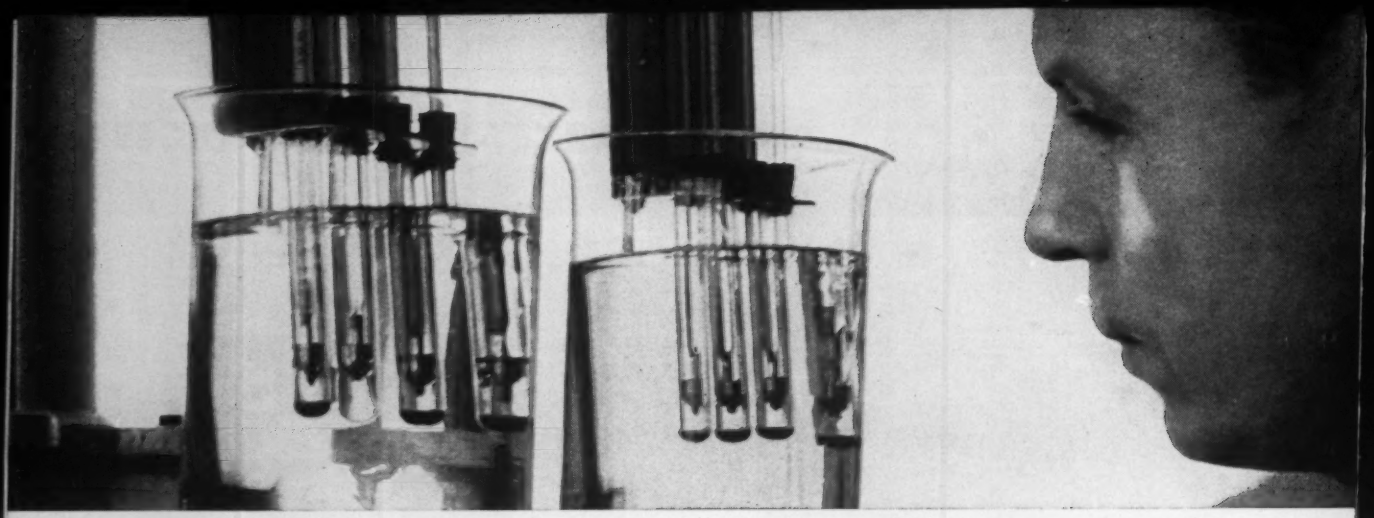
AT LEAST ONE MAJOR COMPUTER MAKER is set to enter the Midwest market by opening a computer center at the end of the year. The move is sparked by market analysis pointing to a vast industrial potential for computer equipment on a lease or rental basis. Chief applications: Production scheduling, design.

ANOTHER ENTRY INTO THE HOME-BUILDING COMPONENTS field is Rheem Manufacturing Co. It is now set up to supply builders with a pre-engineered home "package" ready for site erection. The "package" uses a stressed skin steel structural system.

EXHIBITS AT INDUSTRIAL SHOWS earned a hard look from visitors in a recent survey. Clapp & Poliak, Inc., producers of industrial shows, found visitors want: Alert and technically qualified booth personnel, less high-pressure selling, fewer pretty girls, more products and applications of them, new products, easy-to-understand exhibits, and better technical literature.

A HUGE GROWTH FOR CONSTRUCTION industry is forecast in a new study by the U. S. Dept. of Commerce. A level of $107 billion is predicted by 1975. And a $219 billion annual volume is foreseen by the year 2000. The estimates are in 1960 dollars. New construction now runs at a $58 billion annual volume.

MAKERS OF HARDWARE AND HOUSEWARES consumer products look for a 1962 increase of 10 pct. This is shown in a survey of 259 manufacturers made by Hardware Age. But imports remain a tough problem. Some 28 pct of the surveyed companies report imports more damaging in 1961 than in the previous year.



Dropping point test shows how greases react to heat. Beaker fluid has been heated to 390°F. All greases tested except Darina (second tube from left) have passed from solid to liquid state.

BULLETIN:

Shell reveals the remarkable new component in Darina Grease that helps it save up to 35% on grease and labor costs

Darina® Grease is made with Microgel*, the new thickening agent developed by Shell Research.

Darina lubricates effectively at temperatures 100° hotter than most conventional soap base greases can withstand.

Read how this new multi-purpose industrial grease can help solve your lubricating problems and even save you up to 35% on grease and labor costs.

THERE IS no soap in Darina Grease. No soap to melt away—wash away—or dissolve away.

Instead of soap, Darina uses Microgel—a grease component developed by Shell Research.

What Microgel does

Because of Microgel, Darina has no melting point. It won't run out of gears or bearings.

Compared with most conventional soap-base greases, Darina provides significantly greater protection under adverse service conditions.

Mix water into Darina and the grease does not soften. It shrugs off water—won't emulsify.

Resists heat

Darina will withstand operating temperatures 100° hotter than most conventional multi-purpose greases. It cuts leakage and reduces the need for special high-temperature greases.

Also, Darina resists slumping, thus forming a more effective seal against foreign matter.

Saves money

Shell Darina can reduce maintenance expenses while it protects your machinery. Savings of up to 35% on grease and labor are quite possible.

In some cases lubrication intervals have been extended to double what they were before. Less grease is consumed and less time consumed applying it.

For details, see your Shell Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

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SHELL

A BULLETIN FROM SHELL
–where 1,997 scientists are helping to provide better products for industry

SPACE RESEARCHERS: Engineers at American Rocket Society show study space suit used by Project Mercury.*

Space Probers Meet Growing Research Management Problems

With technology moving ahead at unprecedented speed, research management takes on new importance.

Aerospace research managers indicate they are making some progress against great odds.
By F. J. Starin

■ Aerospace research managers are still playing it by ear in many areas as they tackle the vast problems of probing space.

In spite of a growing number of technological aids, such as high-speed computers that solve in minutes problems with thousands of separate tasks, research managers sometimes have the feeling that they are only standing still.

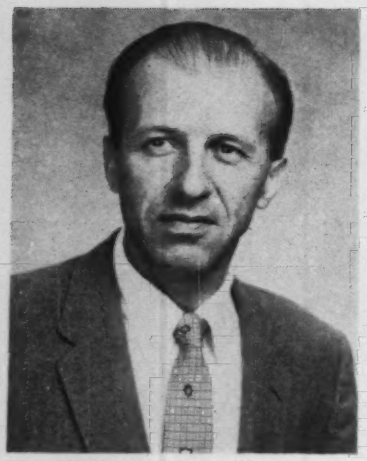
From the Source—This is one conclusion drawn from a series of interviews with top aerospace research managers. Attracted by the recent meeting of the American Rocket Society in New York, they freely discussed their problems and progress in advancing through uncharted areas of research.

Speaking generally, research managers find some of their biggest problems in the relatively elementary areas of time, communications, coordination of operations, and subcontractor relations. But progress is so fast that these "elementary areas" have taken on almost unbelievable complexity.

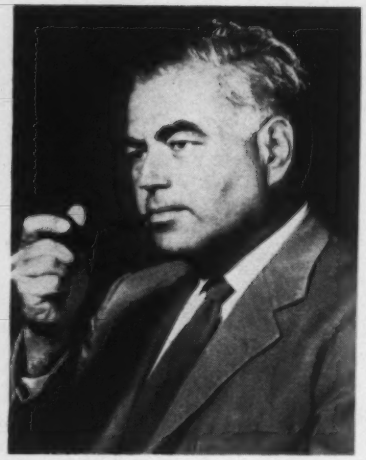
Moving Ahead—But in spite of this complexity, there has been enough progress in this comparatively new field of research management that some of the leading authorities indicate they are finding their way with growing confidence.

"We've made great strides in technical management in the last few years," says Dr. Harold W. Ritchey, last year's president of the American Rocket Society, and director of rockets for Thiokol Chemical Corp. "But in the same time, the problems that we must solve have become much more complex. There

*Left to right: C. E. Sadler, W. G. Bunch, of McDonnell Aircraft Corp., St. Louis.



SPACE MANAGER THIEL: "A researcher can't just sit. He must be there when the problem occurs."



RESEARCHER KANTROWITZ: A problem is communication between lab and company.

is some question as to whether we are keeping up, much less moving ahead."

Are we keeping up? Are we moving ahead? "Yes, I believe so," says Dr. Ritchey, more thoughtfully than emphatically.

Other leading research managers agree with Dr. Ritchey's appraisal, and provide some reasons why. For one, top management, which generally holds the purse strings, is becoming more aware of this growing complexity.

Scientists in Charge—Donald W. Douglas Jr., president of Douglas Aircraft Co., says, "The world is advancing faster and faster into the age of complexity—the age of the computer, cosmic rays, nuclear submarines, space vehicles, hydrogen bombs and cryogenic fuels.

"And the world is turning more and more to the scientists and engineers as the masters of this complexity."

And Don G. Mitchell, vice chairman of the board of General Telephone & Electronics Corp., says point blank, "Today's research is the key to tomorrow." He points out that total industry spending on R&D this year will be more than $10 billion, triple the amount spent 10 years ago. And Mr. Mitchell figures this may double in the next 7 or 8 years.

Computers Assist—Another big reason for the major strides taken by technical management — computers. These are now being used from one end of research to the other. Computers are making decisions. James E. Webb, administrator of National Aeronautics and Space Administration, explained how our national goal of a soft landing on the moon was made:

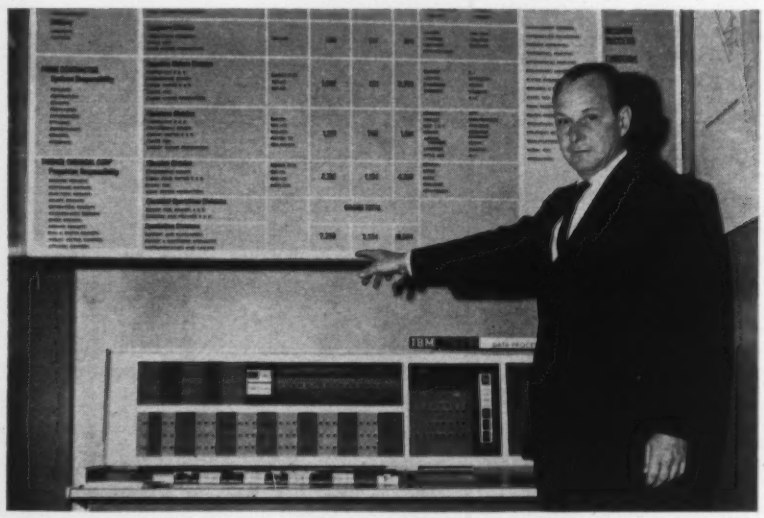
"Through three massive computer runs, 2200 discrete tasks were analyzed using the performance evaluation and review technique to determine that manned lunar exploration was feasible in the 10 year time period. On the third run, we found an acceptable course of immediate action and have initiated a large number of steps to bring it to fruition."

Examples of computer use on more work-a-day levels come from Joseph E. Anderson, a vice president of General Motors, and general manager of the AC Spark Plug Div., which does extensive guidance system work.

Computer Testing—Mr. Anderson's group uses computers to solve complicated math and engineering problems, in cost accounting, for pin-point inventory control, and to simulate rather than physically test a proposed answer to a problem.

Time Factor—GM's Anderson says, "There is never enough time on a project." Dr. Ritchey goes a step further: "One of the key decisions a technical manager must make, over and over, is how much he can afford to pay for how much time saved."

Explained simply, there are usually a number of avenues of approach to solving the problems which present themselves in a major project. Most economical way is to try each in turn until one proves out. To work on more than one at a time usually means a faster solution. But it also means putting high-priced talent to work with the know-



ROCKET MAN RITCHEY: "Problems have become much more complex. Question whether we are keeping up, much less moving ahead."

ing that some of the effort will be for naught.

The trend is definitely toward this simultaneous approach. In fact, Dr. Adolf K. Thiel, vice president of space systems program management, Space Technology Laboratories Inc., a subsidiary of Thompson Ramo Wooldridge Inc., says, "We can no longer afford the time for sequential operation."

On Communications—Good communications is another of the universal knots research managers are trying to untie. And it is one of the most complicated because there is the risk that too much diligence will result in too much time communicating and too little time working. And the implications of poor communications are far-reaching.

Among those with a real understanding of this problem is Dr. Arthur Kantrowitz, vice president of Avco Corp., and director of Avco-Everett Research Laboratory, Everett, Mass.

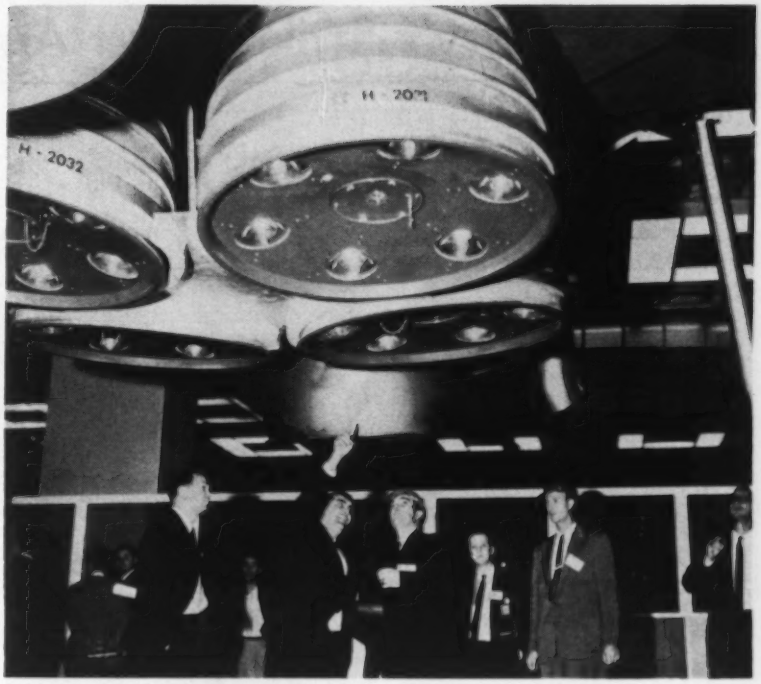
Dr. Kantrowitz splits the approach to research management into two areas—the small, strictly research company, and the facility owned by a large company.

In the latter, he feels the major problem is maintaining communication between the lab and the company itself. And he says these people who work in different areas will have a harder time communicating than people who speak different languages. And, "Interpreters just don't exist," says Dr. Kantrowitz.

The most serious result is usually loss of motivation by the research people.

The Answer — The relationship must be on the basis of mutual trust, says this top research manager. Then, he adds, the researcher is motivated to produce new concepts and ideas, and the businessman will knowingly seek the best payoff from this research.

Dr. Krafft Ehricke, director of the Centaur Program (Centaur is a launching vehicle), General Dynamics/Astronautics, San Diego, feels a key spot where good communications is a must is the development of actual hardware to culminate a program. He says decisions then become difficult because there is always comparison between what has been proved and what is being attempted.



COUNTDOWN COMING: Rocket Society members study business end of Saturn launch vehicle shown by Rocketdyne Div. of North American.

"In making these decisions," says Dr. Ehricke, "there must be a free transfer of opinion and policy between management and research."

An Active Manager—Dr. Thiel agrees on the problem of communications. His basic answer: Initiative. "A research manager can't just sit in his office," he says. "He must be out talking to his people constantly. He can't wait for them to bring their problems to him. By then it may be too late. He must be on the spot when the problem occurs."

Coordination is another of these simple terms that includes a broad variety of trouble spots.

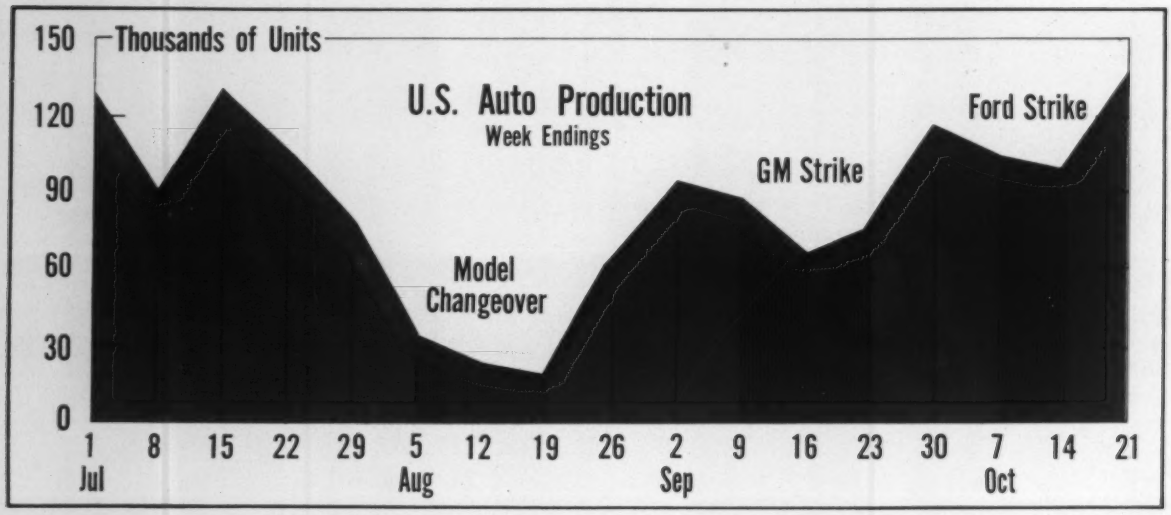
Dr. Thiel feels that within a research organization, coordination means merely good system engineering. But he feels the whole space effort has lacked proper coordination. What is needed, says this newly-elected fellow of the American Rocket Society, is a clear goal and clear authority, before good coordination can be expected.

Rely on Good Men—Richard A. Passman, manager of advanced engineering, Missile and Space Vehicle Dept., General Electric Co., feels that on the research level, good coordination starts by getting the right men and then letting them use their judgment.

Subcontractor Problems — The headache of working with subcontractors ranges from a minor and occasional irritation with a few companies which try to do much of their own work, to a severe pain. Some companies have the majority of the actual work on a project done by subcontractors.

This, say top research managers, is unavoidable. Some of the most sophisticated, specialized talent in the country today prefers to work in its own company, or in association with a handful of others equally competent technically. Many projects require the best brains in a field, and these are often in the small companies.

How Industry's Strikes Hurt Auto Output



Chrysler Next Target for UAW

With the Ford and GM strikes history, the UAW is turning its attention to Chrysler Corp.

While talks on local issues are underway, company officials are glum about prospects.
By A. E. Fleming

■ The automobile industry was getting back on its feet last week. But the footing was still a little shaky as the UAW turned attention to Chrysler Corp., only Big Three company yet to come to terms on a new contract.

Steady Pace—Following settlement of its strike, in which nine production days were lost (not including Saturdays), Ford Motor Co. returned to work Oct. 16.

Gaining confidence from good sales reports in early October, General Motors Corp. put nine assembly plants on six-day schedules to make up for a current 1962 model shortage, an after-effect of a two-week strike in September, during which ten production days were dropped.

American Motors Corp. and Studebaker-Packard Corp., although complaining about automatic transmission shortages as a result of Borg Warner Corp. labor problems, plugged along steadily.

How Long? — Chrysler Corp. moved smoothly along. But with none of its UAW locals having reached agreement on a new contract, the company wondered how long the calm would last.

The overall result of last week's efforts were heartening. Automakers were grateful for their most productive week since last December as 134,000 cars (see chart) came off the assembly lines.

Still, plans to turn out over 600,000 cars in October were wrecked as a result of Ford losses, just as September schedules were knocked for a loop by GM difficulties.

Through last week, strikes had cut 1962 model output by 240,000 cars— 160,000 at GM, 80,000 at Ford. September's 345,000 unit total will be topped in October, which may run around 500,000 if Chrysler isn't stopped during the month. But it will be nowhere near the original goal.

Deliveries Worry Dealers — Because of production difficulties due to strikes, new car inventories went up only 10,000 units over the 645,000 supply on Sept. 1.

And as October progressed, supply holes were showing up. Car makers and dealers worried whether the shortage would put a prolonged damper on sales by permanently discouraging shoppers because of long waiting periods for delivery.

Labor Is Key—But labor is still a key factor. Now that the UAW and Ford have reached agreement on a contract at the last of the company's struck plants (Walton Hills, O., stamping plant), the union looked toward Chrysler, which had been marking time in negotiations.

No strike deadline had been set last week. But if subcommittees which were talking last week could not come up with anything, a strike deadline was in the making for this week. The mood at Chrysler was glum.

Pipe Market Undergoes Change

New Products, Processes Scramble Sales Patterns

Steel pipe pricing, production and product status are being changed by a variety of new developments.

Among the changes: New pipemaking methods, more emphasis on electricweld, increased use of coatings, lighter pipe.
By G. J. McManus

■ The steel pipe industry is seething with change.

After years of orderly development, pipe men now see radical challenges for nearly all the old notions of pricing, production and product alignment.

What's Happening—Both users and producers are looking for new ways to cut costs. This search has already brought:

A rash of new coatings.

A trend toward lighter pipe, produced to more specialized needs.

A partial breakdown of established market divisions.

New and better pipemaking methods.

New coatings have had the greatest impact in the linepipe market. It has been found that inside films for gas transmission lines reduce friction and bring a sharp cut in pumping costs.

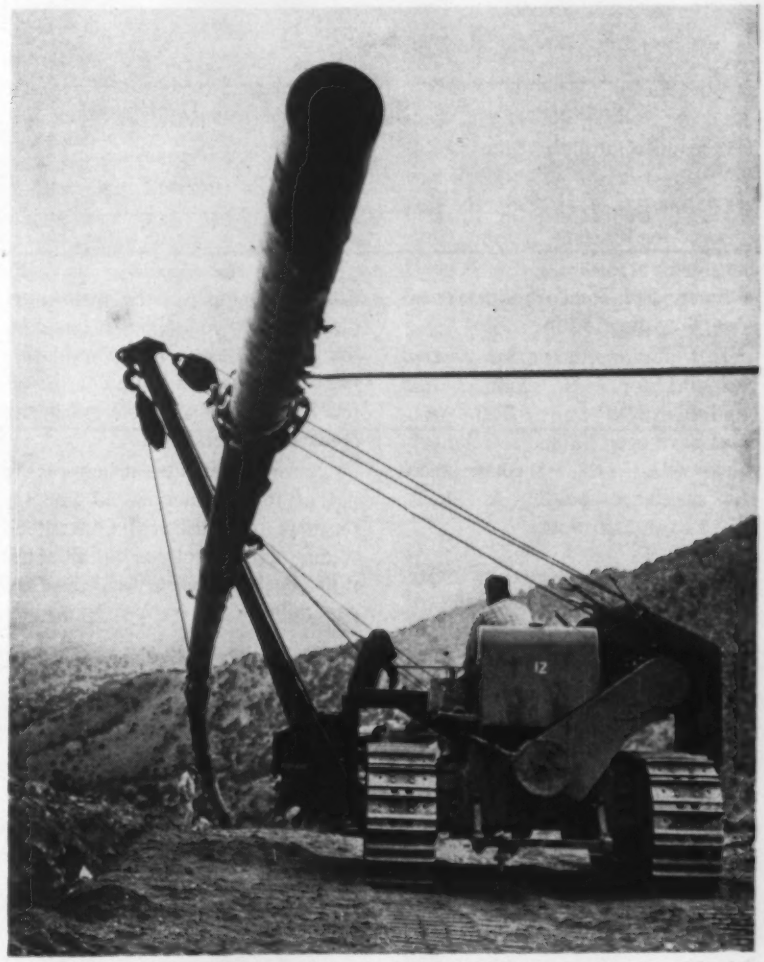
In recent months utilities have stabilized their thinking on this and mills are now applying an epoxy paint. One pipe man predicts all transmission lines will have inside coatings within three years.

More Plastic Coatings—For the smaller linepipe sizes (8 in. and under), outside coatings have become increasingly important. Independent coaters have been applying coal tar and plastic coatings in growing quantities. An extruded polyethylene coating, supplied by Republic Steel Corp., has moved strongly into the picture in recent months. Republic is furnishing coated linepipe directly from the mill. It has licensed three independent coaters to apply the extruded plastic.

At least two new coatings are being readied for the market. Jones & Laughlin Steel Corp. is working with a fluid bed method for exterior coatings. This is seen providing new protection for gas lines leading into homes.

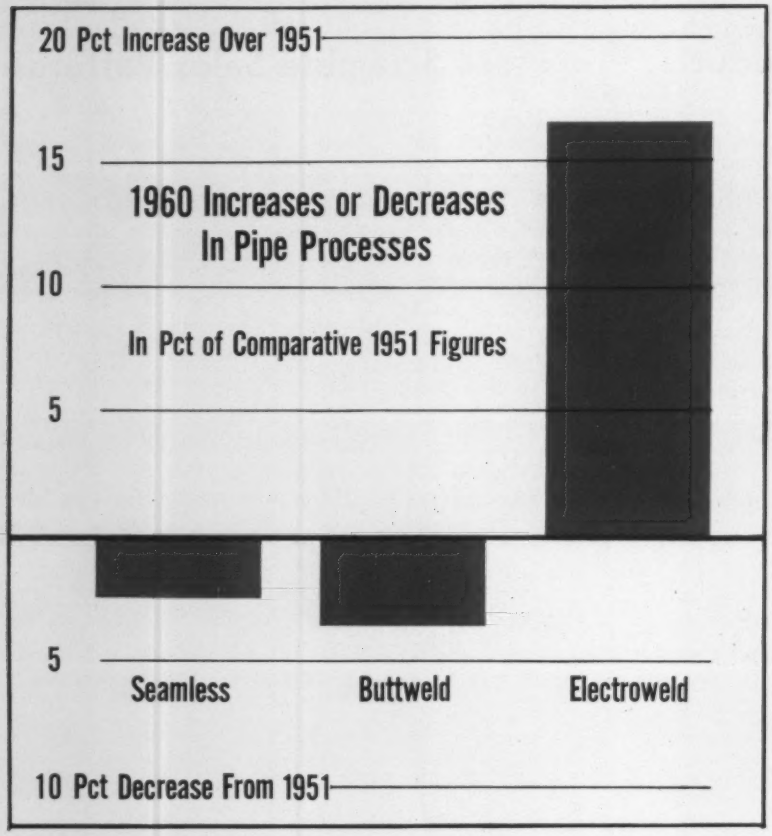
Republic expects to come out soon with an inside liner for the smaller sizes of linepipe. This would protect against corrosion in salt water disposal lines. It would work against paraffin deposits in crude oil lines.

. . . And Thinner Pipe—Along with cathodic protection, the use of coatings has played a big part in the swing to lighter linepipe. With corrosion problems reduced or eliminated, oil producers have been going to thinner walls for low pressure systems. Five years ago, a wall of .237 in. was standard for 4 in. linepipe. A thickness of .188 in. is now



WIDENING FIELD: Favored for linepipe installations, electricweld pipe demand grows as more users ask mills for thin-walled pipe.

Electricweld Output Grows



common and some producers are going down to .142 in.

This slimming down has created problems for both seamless and continuousweld mills. Both processes have been limited to relatively thick walls. On the other hand, electric resistance welding is ideally suited to thin sections.

More Electricweld—As a result, electricweld mills have bitten off a sizable chunk of the market for small diameter linepipe. (See chart, above.) To some extent, this has been a push by smaller companies against the big, integrated producers. Republic is among those offering thin-walled linepipe, but a big part of the competition has come from low volume operations in the Southwest and Southeast.

These outlying mills have moved in with light-walled material, produced in special sizes and lots. This has been priced on a par with continuousweld pipe of the same outer diameter and sometimes below continuousweld. Since electricweld normally commands a premium, the effect has been to scramble prices and reshape markets.

One mill estimates it has lost 50 pct of its continuousweld linepipe business to electricweld. Others tend to discount the volume but all admit it has been enough to weaken prices generally.

Pricing Restudied — Moreover, these events could have implications that extend across all markets. Most standard pipe (about 70 pct) is produced by the continuousweld process. This is a mass production processs, running at high speeds and turning out large quantities. Electric welding is a relatively slow process; it turns out a high quality product. Prices have reflected the differences in quality and cost between the two products.

Now, the linepipe situation suggests old cost differentials may not apply when you get into light walls.

Other New Developments—Republic Steel is working with high frequency techniques for welding pipe. Republic installed one line about a year ago. It is now putting a second into service. According to a mill official, high frequency gives an extremely efficient combination of time, temperature, and pressure.

Another hot technical prospect is stretch reducing. Until recently, this was used in this country only for continuousweld and seamless pipe. Reduction was on a fairly limited scale. Now, two new installations are combining extensive stretch reduction with electric resistance welding.

Aetna-Standard Div. of Blaw-Knox Co. is supplying one reducing unit for the Ambridge plant of National Supply Div., Armco Steel Corp. This will serve a continuousweld mill as well as a new electricweld mill.

First by Lone Star—Lone Star Steel Co. was the first to apply stretch reducing to electricweld pipe. Using stretch mills supplied by Mannesmann-Meer, Inc., Youngstown, O., Lone Star takes 7 in. shells and reduces them to a range of sizes down to about 2 in.

Lone Star has already produced a certain amount of standard pipe by this method. The mill is now being equipped to make conduit and pipe down to ½ in.

Mannesmann-Meer officials say arrangements of this general type give output speeds around 1700 fpm with normal wall thickness and could go up to 2400 fpm with thinner walls. Citing new speeds and other improvements, Mannesmann suggests the old price premium for electricweld may ultimately disappear.

Drastic Changes Unlikely—There is considerable argument on these points. Some insist cw mills are still the most efficient for appropriate products.

Magnesium Tariff Under Attack

Canadians, faced with the tariff and with shrinking markets, may be forced to sell to Iron Curtain countries.

But U.S. producers say they need protection because of their higher costs.

By F. J. Starin

■ On the first evening of the Magnesium Assn. convention, in New York last week, a handful of industry executives and sales people had a lively discussion that lasted until 4 in the morning.

The subject: The 50 pct ad valorem tariff that must be paid on magnesium shipped into the U. S.

This has been an off-again, on-again subject for years. But the fact that it shouldered such topics as prices and growing civilian markets into the background in this session may signal the start of another round of sharp pressure against this duty.

John Thomson, general manager of Dominion Magnesium Ltd., the major Canadian producer, was one of the most active in the discussion. He declined to comment on what others said, but was eager to put his own position on record.

Protest—Mr. Thomson says, point blank, that the current tariff is prohibitive. He would like to see it discarded, or at least reduced to about 10 pct ad valorem.

Mr. Thomson feels that the U. S. magnesium industry no longer needs this much protection. Further, he feels that the additional competition would give buyers more confidence and would help in building magnesium markets in the U. S.

There is little doubt why Mr. Thomson would like to sell in the U. S. The U. S. price for magnesium is 36¢ per lb fob mill at Velasco, Tex., or Selma, Alabama. The Canadian price is 31¢ per lb, Canadian. But demand is reasonably small in Canada, so much of Domag's output goes to Europe, where the going price runs around 27¢ per lb.

Shrinking Markets—But there's more to it than that. Domag is faced with shrinking markets. While there is no tariff on magnesium shipped to W. Germany now, a major market, there will be under Common Market regulations. Competition in other European countries is very severe. Japan is just about self-sufficient. And there is little or no market in Latin America.

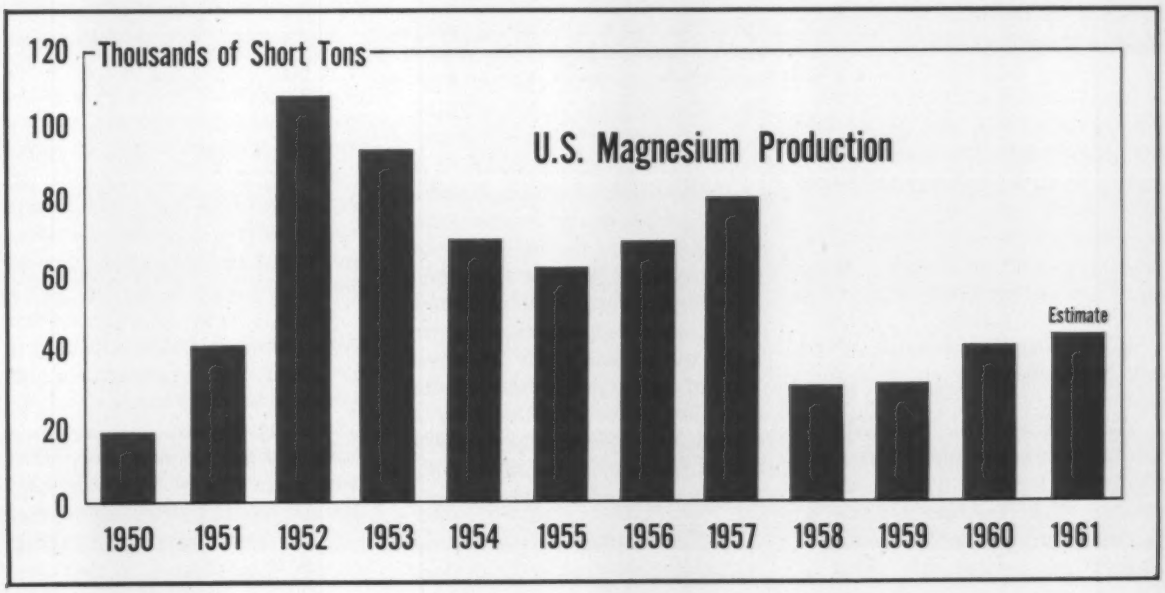
Mr. Thomson says that for its very survival Domag must soon either sell in the U. S. or behind the Iron Curtain.

Officially, major U. S. producers have no comment on the matter of tariffs. Spokesmen unofficially are dead set against any change right now.

For one thing, it would certainly pull the magnesium price down.

Off the record conversations with U. S. magnesium people leave the impression that if it were only Domag knocking at the door, it might stand a good chance of being opened, at least a crack.

Other Threat—But one spokesman says that the government-subsidized magnesium industry in Norway also poses a threat to the U. S. makers. There is a very strong rumor around that already low-cost Norway will shave costs still further by arranging for supply of raw material from behind the Iron Curtain at rock bottom prices.



TOUGH ENOUGH? Critics contend Prime Minister Ikeda has not told the full economic facts to Japanese people.

Report From Tokyo

Why Japan Has to "Go Slow"

Japan's tremendous industrial rise in the past decade has put it in an unfavorable balance of payments position.

The only alternative to a slight slowdown now is a serious economic problem later.
By Tom Campbell

■ Japan is having growing pains. The government is putting up the "Go Slow" sign. But it is hard for such a dynamic economy to take a slower pace.

Unless things are "unheated" a bit, Japan is in for trouble. When the U. S. Cabinet members come here late this month for a confab with top Japanese officials, there will be mutual and understanding talk.

Both nations have been having trouble with international balances. Currently, Japan is having serious trouble. There has been a deficit in recent months and weeks. Also, the reserves are down sharply. That is why serious-minded top officials here in Tokyo say it is a "must" to cut back a bit.

Rate of Growth—Things have been at such a fast rate of growth—with equally fast spending that goals set up some time ago have been shattered. Gross national product and industrial production have climbed much faster than anyone here believed possible. The increases have been sharp even since last April.

Just what do Japanese business men think of this attempt to hold back a little so the economy can get a breather? In some areas there is belief that things will be "better" soon, so talk of cutbacks are not taken too seriously. In other sections of industry it is believed that it is imperative that there be a strong effort to delay some spending if the economic situation in Japan is to be kept under control.

At Least a Slowdown—Generally, the attempt to slow things down some means a temporary halt in the fabulous growth in all statistics. One might say that what is happening here is a recession a la Japanese. The main difference between a U. S. recession and one here is that in the U. S. it lasts a little longer. A plateau here is considered a decline.

Exports are now somewhat less than imports. This is not good for a nation that must live by exports. Further, in recent months local or domestic activity has been so strong—and lucrative—that many Japanese businessmen have not always paid as much attention to export possibilities as they used to—and should.

There is some feeling here that Prime Minister Hayato Ikeda has not been tough enough in his speeches to the Diet and to the people about the seriousness of Japan's financial condition. The story goes that if he bore down hard and let the chips fall where they may, he would have better luck in slowing things down a little—but

perhaps less political luck.

The Future—At any rate, here's the outlook for Japan's strong economy:

1. Projects that have been committed will be carried out.

2. The government will keep a close watch on the expenditures made by industries. This will apply especially to large-scale spending—new and old.

3. The steel industry and other industries will try to "unstretch" their forward movement in the next several months. This will mean that many large-scale projects will be delayed—but not washed out.

4. Applications by Japanese companies to spend dollars will be closely checked and the clamps are on unless the projects fit into the present—and temporary—goal (slowdown) of the government.

5. Attempts will be made to bring home the seriousness of the low state of reserves, the imbalance in trade payments, and the lack of enthusiasm by some to export more.

6. No strong measures will be taken to curtail the actions of domestic consumers. But an attempt will be made to more fully acquaint the people with their responsibilities.

On a Plateau—When top economists here in Tokyo talk about a recession—or a stoppage of the upward march—they mean a plateau. This time, however, there may be an actual drop in the production index. This may range from 5 to 10 pct, depending on the validity and effectiveness of the government's action. It also depends on the sincerity of the business world here in trying to avert more serious troubles—and more rigid controls.

Top government advisers here believe that the plateau or recession will last no more than a year or a year and a half. Even then, that includes the time from the start of the recession to the full recovery. There will be no change in the double-the-gross-national-product-in-ten-years plans of the government. Also, it is doubtful that the index of production will fall for more than six months. And the recovery may be so strong that, in the current full year or in 16 months, the average indexes will be about equal to the previous year.

In the case of a drop—relatively—in the gross national product in Japan, economists feel that if the rate of gain drops to 3 or 4 pct a year, that is a recession. In the States that would be excellent news. But here, where the rate this past year has been 13 pct or more instead of the 7.2 pct yearly, long-term increase, a change even temporarily to 3 pct is bad news.

Imports Cut—Chances are that imports of new heavy equipment here in Japan will be cut back about 5 to 10 pct—after present commitments are satisfied. Also, there will be a similar reduction in the imports of iron ore and scrap. This will be—officials repeat with emphasis—a temporary plan and will in no way affect the long-term.

NEXT WEEK

Japanese Trade Red China Vis-a-Vis U.S.

Japan's present and future trade relations with Red China and the United States will be analyzed in next week's Report from Japan.

Already, the so-called estimate for steel output in 10 years (which reaches a peak of 48 million tons in 1970) is being boosted by steel officials by at least 12 million tons. This figure of 60 million tons may be a bit optimistic.

The so-called light industry operations—cameras, radios, tv's, binoculars, etc.—will not be curtailed for the simple reason that by this method Japan hopes to help straighten out her imbalance of international payments. Last year exports were close to the target of the 10-year program. The hitch was that imports were much higher than the 10-year plan envisaged.

The Alternative—If there is no appreciable change in the import rate and if the balance of payments continues to be unfavorable, there will be severe trouble for the country. Since the government wields much more power in Japan than in the U. S., it is a foregone conclusion that industries which do not cooperate will be whipped into line. The Prime Minister, who up to date has soft-peddled the crisis in Japan, may be forced to take more action.

Japan's top optimist for the future, he hopes that the meetings between U. S. cabinet members and Japanese government people here late this month and early next month will make some of his problems a little easier.

Talk Topics—Along with the official agenda, **IRON AGE** has learned that the following sensitive subjects will be given a thorough airing:

1. Talk on regulations against Japanese imports (Japanese exports to the U. S.). This will take in long discussions concerning the U. S. anti-dumping law, escape clause of the reciprocal trade regulations, and the Buy American trend.

2. Talks on the movement in U. S. to restrict imports from Japan. This will cover a long range of examples. The Japanese fear that the Texas action of banning construction steel from Japan will grow.

They are worried, too, about the reports that Japanese imports to the U. S. are displacing large numbers of American workers and plan to take this up with Secretary of Labor Arthur J. Goldberg.

3. Buy American policy will be thoroughly discussed. Since the U. S. government has far less power within business than has the Japanese government, such talks without American business being represented mean less than supposed. But the discussions will be lively. The Buy American movement has frightened the Japanese.

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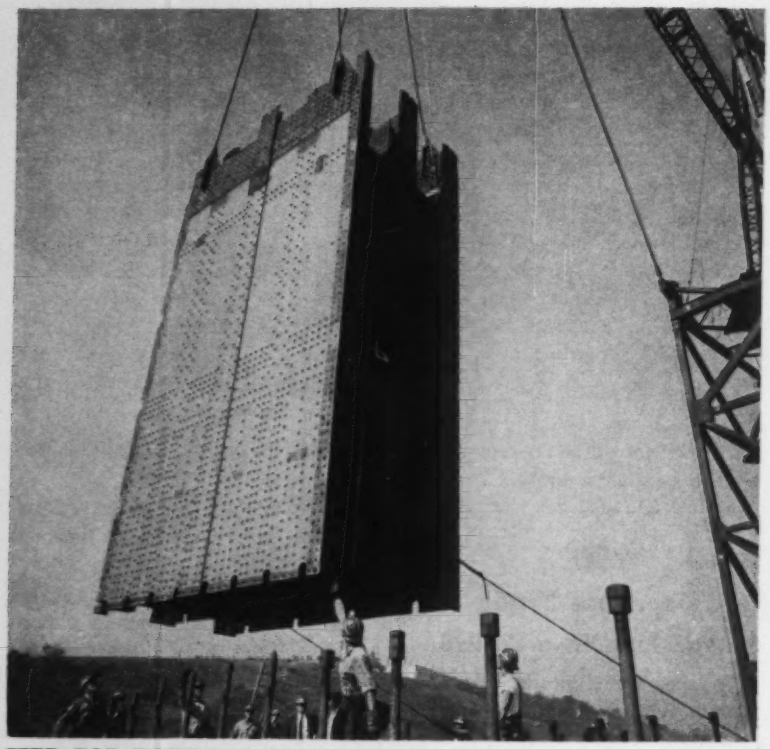
Narrows Bridge Gets First Steel



TIER FOR TOWER: Bethlehem Steel Co. ironworkers set the first steel tier section for the 690-ft Staten Island tower of the $325 million Verrazano-Narrows Bridge. The tower will use 27,000 tons of steel.

UAW: No Extension At Allis-Chalmers

Allis-Chalmers' request for a one-year, no-change extension of its labor contract was turned down by the United Auto Workers.

Locals were determined to press for a settlement similar to that reached last week by International Harvester and John Deere. The other farm implement makers agreed to wage increases of 2.5 pct or 6 cents per hour, plus full payments of health insurance by the company and other fringes.

Allis-Chalmers, in the midst of a cost-cutting drive, recently indicated salaried employees were receiving cuts in salary ranging from 5 pct to 15 pct.

Ghana Dam Project Shapes Up Again

The off-again, on-again Volta Dam project in Ghana looks like its on again. The U. S. is again considering financial help for the project.

The original offers were withdrawn when it appeared Ghana was moving closer to Russia. Now, President Kennedy is sending a "cabinet level" review team to Ghana to appraise the situation.

Two U. S. aluminum companies, Kaiser and Reynolds, have a vested interest in the project. They are to build a huge aluminum smelter plant in connection with the dam, with Kaiser financing the major share.

President Pushes For Tariff Cuts

President Kennedy's foreign trade aides are now preparing a new international trade program for the U. S. It is expected to call for unprecedented cuts in U. S. tariffs.

Formulating this program is hard enough. But the toughest test will come when the program reaches Congress next year. It shapes up as the legislative battle of the session. Protectionist sentiment is growing in Congress.

The President is marshalling his forces behind the program. Cabinet members and White House aides have the message—push the trade program. The President apparently will settle for nothing less than across-the-board reductions in U. S. tariffs.

Iron Ore Tonnage Tops '60 on Lakes

Iron ore shipments across the Great Lakes rose above the 1960 level in September, first year-to-year gain in 1961.

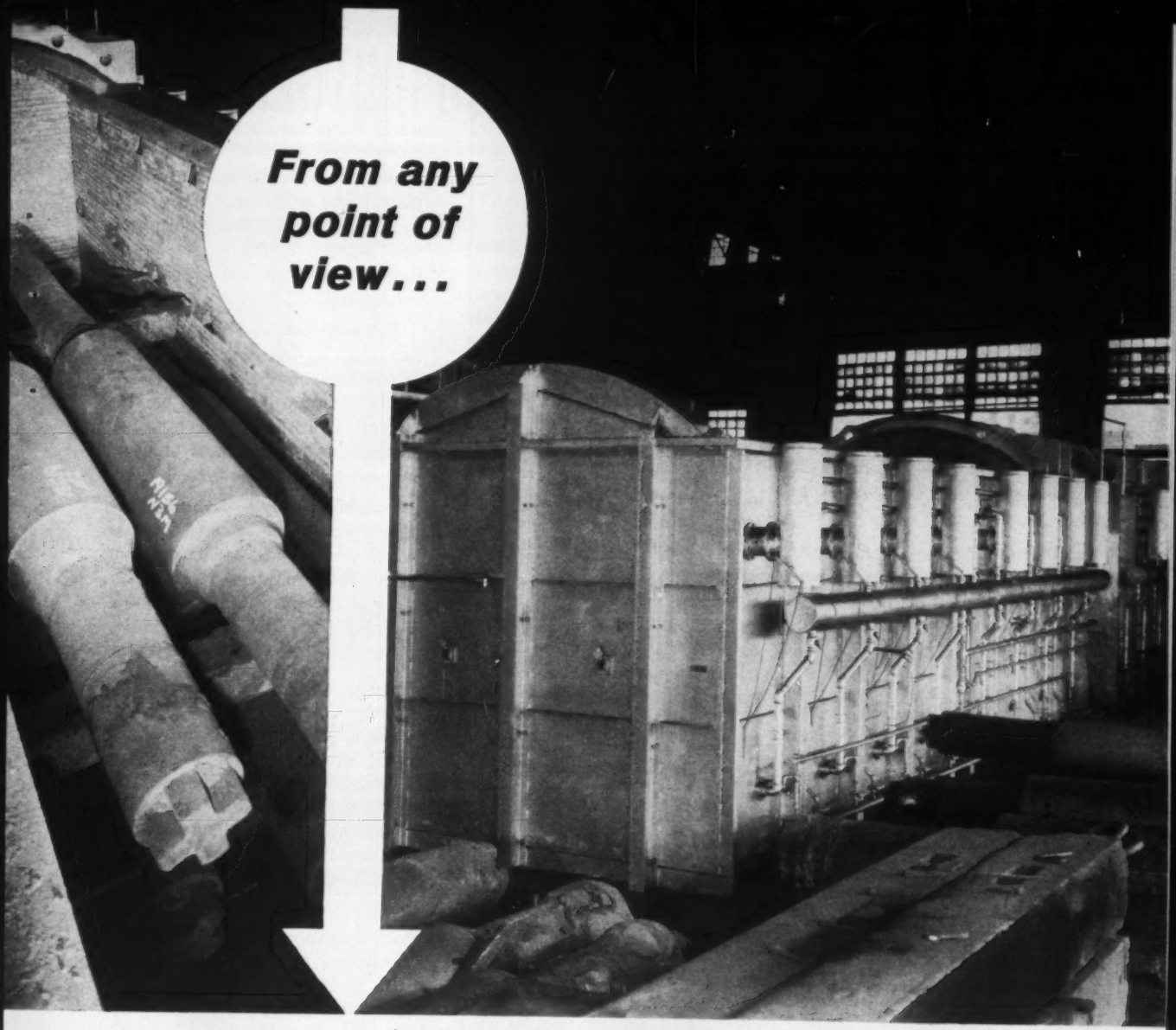
Steel industry ore use jumped in September. Ore consumers may be hedging against a mid-1962 strike against steel producers, when United Steelworkers contracts run out.

In the steel strike of 1959, most U. S. iron mines were closed and ships idled. Afterwards, there was a burst of activity as steelmakers rebuilt ore inventories — so much so, that there were towering stockpiles at lakeside docks and in mill storage yards. These stockpiles are now slowly being reduced to more normal proportions, lake men say.

Ford, North American Unveil Joint System

Ford Motor Co. and North American Aviation, Inc. unveiled plans for a revolutionary mid-air satellite or space-probe launching system. It would use piloted B-52 and X-15 aircraft as early stage boosters.

As proposed for the Air Force, the process would use a B-52 eight-jet bomber for the first stage booster, the X-15 for the second stage. The third and fourth stages would be filled by USAF Blue Scout, an economical rocket system that has been fired successfully six times at Cape Canaveral. Cost of putting satellites into space or orbit would be sliced. Both the B-52 and X-15 would return to earth after Blue Scout was launched.



Installation at Pittsburgh Works, Mackintosh-Hemphill Co., Div. of E. W. Bliss

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INDUSTRIAL BRIEFS

Copper Outlay—American Metal Climax, Inc., is investing $1.755 million in new melting, casting and handling facilities to increase production of OFHC copper at the U. S. Metals Refining Co., Carteret, N. J. OFHC copper is produced by direct conversion of selected refinery cathodes, under conditions which prevent contamination of the pure oxygen free metal during the process.

Cast Iron Growth — Bentonville Casting Co., Bentonville, Ark., has added 8000 sq ft of working space to its iron casting facilities. First stage of the expansion program cost $60,000.

New Offices—Huck Manufacturing Co., Detroit, has opened new offices at Wichita, Kan., and Seattle. Since June, Huck has opened six new sales offices, expanding its market in blind rivets, bolts, fasteners and installation of tools for aircraft, auto and electronic industries.

Electronic Lab—Industrial Div., Birtcher Corp., Monterey Park, Calif., has opened a new laboratory for research and development of electronic heat transfer devices and thermal problems relating to electronic packaging. It is fully equipped for problems of heat transfer.

Space Section — Roblin-Seaway Industries, Inc., Buffalo, has formed a new Space Metals Division. It will develop and produce special high temperature metal alloys for rocket and jet engines and other space industries.

Another Line—AiResearch Manufacturing Div., Garrett Corp., Los Angeles, is expanding its product line into storage, transportation and pumping of cryogenic fluids for ground support applications. The line will include cryogenic high pressure pumps, couplings and samplers, and cryogenic recharger vehicles.

New Owner — Richards Industries, Inc., a new company, has acquired Dover Corp.'s OPW-Jordan Div. Under the name Jordan Valve Div., manufacturing of regulator and control valves will be carried on in Cincinnati.

Self-Induction — Allvac Metals Co., Monroe, N. C., has ordered a 10,000-lb induction vacuum melting furnace. It is expected to be operating early in 1962. The new facility will cast ingots for the company's own use and electrodes for re-melting in arc-melting furnaces.

Graphite Field—Beryllium Corp., Reading, Pa., plans to produce pyrolytic graphite components for the aerospace and nuclear industries. It is a thermally absorptive material that can withstand temperatures in the 4000 to 6000° F. range.

Bigger Quarters — Inductotherm Corp. has moved to a new plant at Rancocas, N. J. Production of high frequency induction melting and heating equipment will be expanded.

Furnace Shift — A. F. Holden Co. has moved its headquarters to a new plant at Milford, Mich. All industrial, electrode and pot furnace production and engineering operations have been moved there.

System Center—Grumman Aircraft Engineering Corp. has opened a new $5 million Electronic Systems Center at Bethpage, N. Y. The new building houses advanced electrical and electronic equipment to test aircraft and space systems.

Coating Line—Marwais Steel Co. is putting a wide continuous strip paint coating line in operation at one of the Richmond, Calif. plants. It will continuously prepare and apply paint to steel and aluminum coils up to 50-in. wide.

Sound Buy — Howe Sound Co. has acquired for cash Pennsylvania Electric Steel Casting Co., Hamburg, Pa.

Doubled Research—Atlantic Research Corp. has opened a new addition which doubles the work area of its principal headquarters and laboratories at Fairfax County, Va. It will consolidate under one roof two Atlantic divisions, Jansky & Bailey Div. and the Desomatic Products Div.

Opening Date — Rheem Manufacturing Co. will open its new development center for the Home Products Group in Chicago on December 1. It will concentrate on research and development of heating and related equipment.

National Buildup—National Supply Div., Armco Steel Corp., is winding up an expansion program at its Houston plant. New sucker rod, drill collar and warehouse buildings, plus two service lean-tos, increase operating space 150 pct.

Scrap Cars—Pennsylvania Engineering Corp., New Castle, Pa., is building a large scrap charging machine for Great Lakes Steel Corp., Ecorse, Mich. The 3000-cu ft capacity car for charging scrap to two 300-ton basic oxygen furnaces will be placed in service next year.

United Stand—Kearney & Trecker Corp., Milwaukee machine tool company, will move its entire operations to the present Highway 100 plant in the next year. About $3 million will go into the expansion and consolidation move. Material handling facilities and a new office wing will be added.

Chemical Market—Kaiser Aluminum & Chemical Corp. is expanding manufacturing and marketing operations in the chemical industry. A $6 million plant to produce hydrogen fluoride and fluorocarbons is being built near the alumina and caustic-chlorine plants at the Gramercy, La., Works.

Tooling Up—Standard Electrical Tool Co. is building a new plant at Cincinnati to expand production of precision spindles and other machine tool products. New tools, gauging and other instrumentation will be added to the facility, scheduled for completion in 1962.

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2 5-YEAR WARRANTY. We fully warrant the TAPE-O-MATIC drill against defective parts and workmanship for 5 years from date of purchase.

3 UNIQUE TERMS. You can buy TAPE-O-MATIC using our exclusive Trade-in Plan. You can purchase the drill outright, lease it, or lease it with option to buy. ONE PER CENT CASH DISCOUNT FOR PAYMENT IN 10 DAYS.

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When to Consult a Consultant

Going outside for advice is sound if both management and consultant concentrate on getting worthwhile results.

More companies rely on outside experts, but some feel services could be improved.

■ Top managers make more decisions than football quarterbacks. But, like quarterbacks, they must decide when to go "outside" and when to stay "inside."

"Outside," of course, means the use of consultants and specialists, while "inside" means using company personnel, time, and materials on special projects and studies.

A detailed survey of management consultants reveals why companies go "outside" to get things done—and how they feel about the results. It was put together by E. A. Butler Associates, Inc., New York-based management consultants.

Growing in Use—Over 140 companies, varied in size and activities, answered questions on why and how they used consultants. Far from a whitewash of the profession, it frankly analyzes both the good and bad in consulting.

First, it's pointed out more companies are turning to the use of management consultants. Almost 90 pct of those who took part in the survey have used consultants, more than 50 pct used them within the last three years.

What They Want—As might be expected, the outsiders were hired for a variety of reasons. The greatest number were called in on special assignments. However, many of these assignments deal with basic activities such as paperwork flow, systems and procedures, plant layout and design, etc.

But some cases are individual problems of specialized nature calling for great understanding on the part of the consultant.

Apart from special assignments, consultants are called in on market surveys, reorganizations, executive replacements, and acquisitions and mergers.

Time spent on projects can vary. It can range from less than a month up to a year or more, but the average, based on the answers, is about five months.

How satisfied are the companies with the results? The record is good for the consultants, but not impressive. When asked, "Did the consultant accomplish the job to your satisfaction?" more than 60 pct answered "Yes," but over 20 pct said "No." An additional 10 pct were partly satisfied.

What Can Go Wrong?—Where are the areas of dissatisfaction? The client companies believe the relationship could be improved if consultants provide more follow-up, did not prolong the assignments, used more competent men in the field, and had a greater understanding of the client's business.

Additional complaints were that consultants should provide their own answers to problems and not parrot management's views, the job should be more thoroughly defined before consultants undertake it, and consultants should provide more information from the assignments.

Answer These Questions First

■ How does a company decide when to bring in a consultant?

Mr. Butler puts it this way: "When a client weighs the advantages of bringing in an outside consultant, he is measuring the anticipated cost of the consultant against the cost of diverting his own personnel to the project."

Check Need and Cost—"As with any business decision, a top executive should go through a number of thought processes before he arrives at a decision to hire or not to hire a management consultant.

"First, he must realize that a problem exists or have in mind a specific project.

Answers Needed—Before hiring a consultant, Mr. Butler says, a manager should ask these key questions:

Who will perform the actual work? Will it be a principal of the firm? If not, what kind of staff do they have; what are their qualifications for the job?

Are the terms of the project specifically defined in advance? Is there clear understanding on both sides about objectives of the assignment?

Has there been a reasonable estimate made of the time needed to get the work done? Do you agree with the estimate?

Adds Mr. Butler, "We also feel sincerely that the above questions may be asked by the consultant of himself, before he undertakes an assignment."

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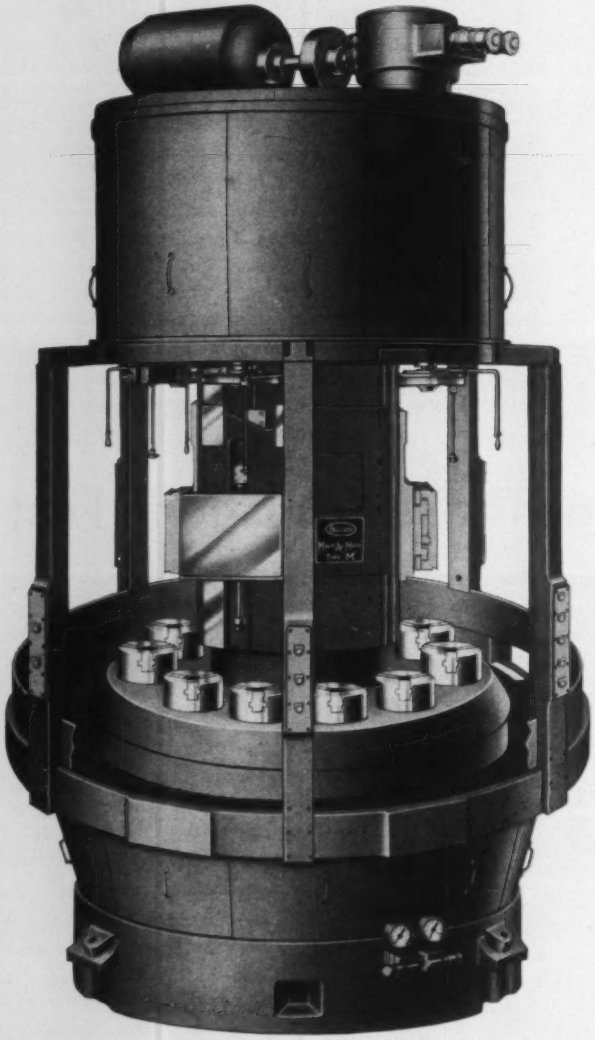

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Where More Zinc Fits Into '62's

Use of Zinc Goes Up 10 Pct in New Model Cars

Some of the added zinc shows up in trim in the new cars. Some is hidden in extra galvanized.

Generally, use of zinc is greater on almost all of the new cars than on '61 counterparts. By A. E. Fleming

■ The American Zinc Institute says 1962 cars will contain 10 pct more zinc than 1961's.

Well publicized is the big gain shown this year by galvanized steel, of which zinc is a main ingredient. Most new models have galvanized rocker panels, or door sills as they are called by some.

What Are the Gains?—Less publicized are other gains by zinc. According to the AZI, seven 1962 cars have made complete changes to zinc diecastings from either aluminum or plastic in grilles, headlight housings and taillight housings (the frames that surround the glass).

The Buick Special has switched to zinc from aluminum for all three parts—grille, headlight and taillight assembly. Big Oldsmobiles have gone to zinc from aluminum in the headlight assembly. The smaller Olds F-85 has adopted zinc instead of aluminum in headlight and taillight assemblies. The Mercury Comet has substituted zinc for plastic in the taillight assembly.

In the Brightwork — In some cases, changes were made only in the top series of the particular car make, where "brightwork" is most prevalent.

According to AZI information, other zinc inroads have been made in components which were entirely aluminum in 1961, but now are partly aluminum, partly zinc. Or where aluminum and zinc was used last year, but only zinc is used this year. Examples are the Pontiac Tempest taillight, Cadillac grille, Mercury grille, Dodge headlight and taillight, and Studebaker grille.

Reason for Change — What are the reasons for zinc's greater use in grille and light assemblies?

Basic reasons pointed out by zinc proponents are the ease with which the metal can be diecast into intricate shapes, maintenance of dimensional tolerances with minor secondary finishing operations and improved plating finishes.

Die Castings in 1962 Model Cars

A = Aluminum, Z = Zinc, S = Steel, P = Plastic

	Grilles		Headlight Assemblies		Taillight Assemblies	
	1961	1962	1961	1962	1961	1962
GENERAL MOTORS						
Chevrolet	A	A	A	A	A	A
Pontiac	Z	Z	Z	Z	Z	Z
Pontiac Tempest	A	A	A	A	A	A&Z
Buick	Z	Z	Z	Z	Z	Z
Buick Special	A	Z	A	Z	A	Z
Oldsmobile	Z	Z	A	Z	Z	Z
Oldsmobile F-85	A	A	A	Z	A	Z
Cadillac	A	A&Z	Z	Z	Z	Z
FORD MOTOR COMPANY						
Ford	A	A	A	A	A	A
Mercury	A	A&Z	Z	Z	Z	Z
Mercury Comet	A	A	Z	Z	P	Z
Lincoln	Z	Z	Z	Z	Z	Z
Thunderbird	A&Z	A&Z	Z	Z	Z	Z
CHRYSLER CORPORATION						
Plymouth	A	A	A	A	Z	Z
Plymouth Valiant	A	A	A	A	Z	A&Z
Dodge	A	A	A	A&Z	A&Z	Z
Dodge Lancer	A	A	A	A	Z	Z
Chrysler	A&Z	A&Z	Z	Z	Z	Z
Imperial	Z	Z	Z	Z	Z	Z
AMERICAN MOTORS						
American	A&Z	Z	A	A	A	A&Z
Rambler	A	A	Z	Z	Z	Z
STUDEBAKER-PACKARD						
Studebaker	S&A	S,A&Z	A	A	P	P

Source: American Zinc Institute.

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Engineers Talk Space Problems

Materials, Techniques, Futuristic Ideas Get a Going-Over

SAE meeting in Los Angeles brings out the fantastic and the practical in space developments.

New machining techniques for space parts draw attention. Metals understanding needed.
By R. R. Kay

■ Fly anywhere in the world within two hours? It's now technically feasible to build such a jetliner.

Future spacecraft may take the shape of a flying saucer.

Electron beam welding will find more and more use in the aerospace industry.

There's a completely automatic landing control system. It doesn't rely on the human pilot to take over in case of failure. In a couple of years, British jetliners will use it.

Wet Stop—How to stop jet aircraft from over-running landing strips? Possible solution: A 600-ft basin at the end of a landing runway, filled 2-ft with water and covered with a flexible mat.

Moon explorers may wear hard-shell spacesuits attached to supply carts.

Improvements are coming along on both chemical milling and electro-chemical machining. Refractory metals such as molybdenum, tungsten, tantalum, and beryllium are now chemically milled with good results.

Machining Advances — Electro-chemical machining techniques have improved to where they are competitive or cheaper than conventional machining. That is, where the parts are complex, contoured or are in heat-treated condition.

These are just a few of the things engineers and production men heard in Los Angeles last week. Event: Society of Automotive Engineers National Aeronautic and Space Engineering Meeting.

Space Materials — What about materials for space vehicles? W. R. Lucas, George C. Marshall Space Flight Center, says we probably won't be able to count on finding brand new materials. We'll have to make more efficient use of those we now have.

"This can come through better understanding of their basic nature and of the environment in which they must perform.

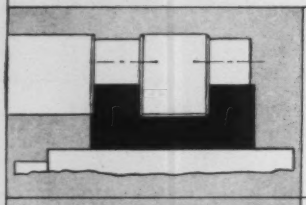
"Of course, we'd be delighted to have new materials that would solve many of our problems. But we're not standing by waiting for breakthroughs. We're seeking to apply what's available," Mr. Lucas says.

If You Can't Stand the Noise—

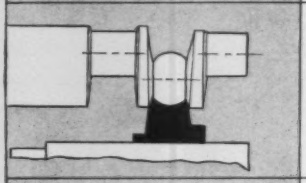
SOUND TESTING: Sound, as a destructive force, is used to test aircraft and missile parts in this "reverberant" tank. Goodyear engineer prepares a test at Litchfield Park, Ariz., environmental testing center.

Eccentric Forming on Greenlee Automatic Bar Machines

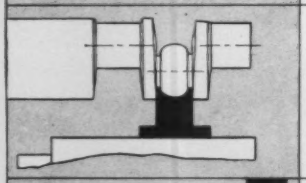
MACHINE . . . 1-5/8" — 6 Automatic Bar Machine
TOOLING . . . High Speed Steel
MATERIAL . . . B1112
STOCK SIZE . . . 1" round
TOOL SLIDE STROKE . . . 1-3/16" at .0042" feed
SPINDLE SPEED . . . 420 rpm 110 sfm
MACHINE TIME . . . 43 seconds
ESTIMATED GROSS PRODUCTION . . . 83 per hour



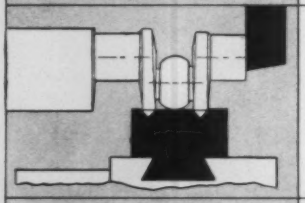
1. Rough eccentric form .550" diameter and 1/32" radius.



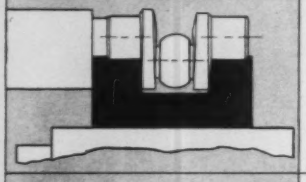
2. Rough eccentric form .643" spherical diameter, finish form inside tapered sides, and 1/32" radius.



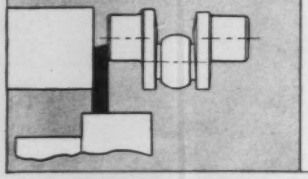
3. Finish eccentric form .643" spherical diameter and .023" radii.



4. Face end. Break corners on 1" diameters.

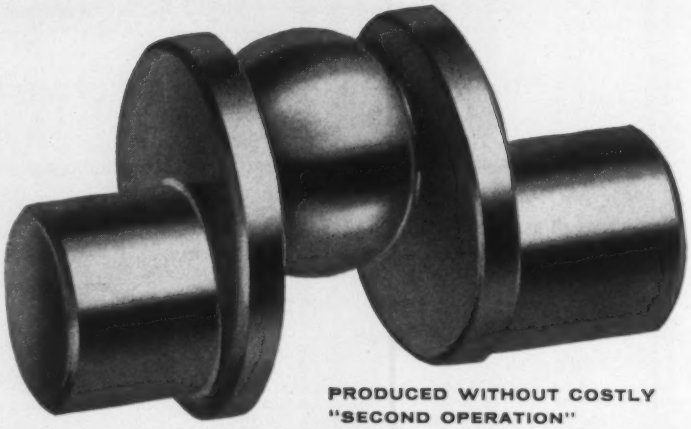


5. Finish eccentric form .550" diameter, outside tapered sides, 1/64" radii, chamfer 45° on ends, and break-down for cutoff.



6. Cut off.

Write for your copy of Catalog A-405

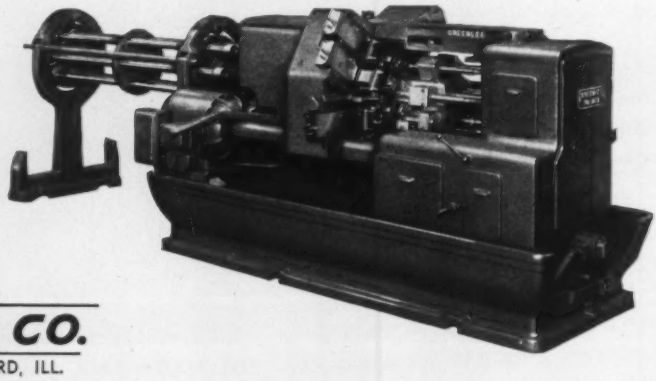


PRODUCED WITHOUT COSTLY "SECOND OPERATION"

"Union Special" relies on GREENLEE versatility to cut production costs of multiple eccentric crankshaft

Standard Greenlee Automatic Bar Machines are extremely versatile. Union Special Machine Company, manufacturers of industrial sewing machines, utilizes this production versatility to machine the multiple eccentric crankshaft illustrated. The part is machined from 1" round B1112 stock and is held in standard concentric collets. Part is machined in 43 seconds giving a gross production output of 83 pieces an hour. Sequence of operations is shown at left.

Special eccentric forming attachments mounted in the first, second, third, and fifth forming slide positions, rough and finish form the two eccentric diameters. Greenlee Bar Automatics permit greater job versatility and assure added profits. See your Greenlee representative or send us a print of your problem-part.



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What's Next in Depreciation?

Reaction Varies to Textile Machinery Move

Industry is not agreed on impact of Administration's move to liberalize depreciation for textile machinery.

But many hope it is a move which could lead to real reform. By R. H. Eshelman

■ Reaction to the administration's sudden liberalization of depreciation on textile machinery ranges from pure astonishment to cynical skepticism.

One view frequently expressed in machine tool circles is that the Treasury Dept. is not going to give up many dollars now with a growing deficit staring Uncle Sam in the face.

The textile announcement, made by President Kennedy, substantially cuts the Internal Revenue Service's estimate of useful life for textile machinery. This is now scaled down to 15 years generally, in some instances 12 years.

A Breakthrough? — The White House states that "the resulting speeding up of depreciation deductions, which reflects current technological conditions, will be of significant help in the industry in enabling it to modernize, meet foreign competition, and provide jobs."

MAPI (Machinery & Allied Products Institute) in comment on the move says this is "unquestionably an important breakthrough in . . . depreciation reform." MAPI points to three important gains:

1. Recognition (by the Treasury) of the facts of rapid technological change; 2. a broad area for administrative action is possible without changes in tax laws; 3. top government policy now acknowledges effect of very liberal foreign depreciation allowances on competitive position of U. S. industry.

Goes Further—Even more important to metalworking generally, and the machine tool field in particular, is a further statement by a top Treasury official. Under Secretary of the Treasury H. H. Fowler, in a speech on Oct. 12 explained that "the significance of this announcement goes far beyond the textile industry, important as that may be."

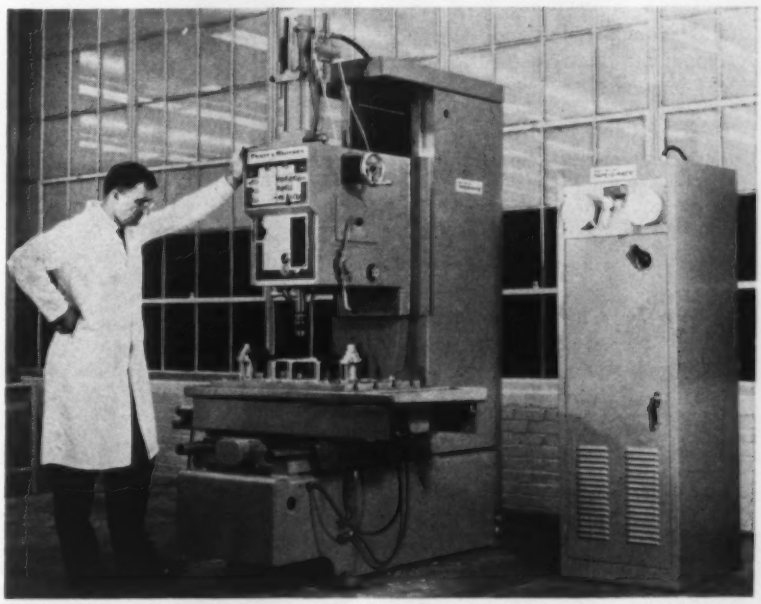
In referring to continuing Treasury studies of other industries he says: "Adjustments will be suggested wherever recent and prospective technological developments can be shown to be opening the gap between existing practices and the requirements imposed by such developments."

Some Skepticism—Some machine tool people wonder, is this just some more government gobbledygook? Or what does it mean?

MAPI, for instance, notes that this administrative action can cut both ways. While it now gives lip service to technological advance, clear signs point to a tightening of the Internal Revenue Service's review of salvage value.

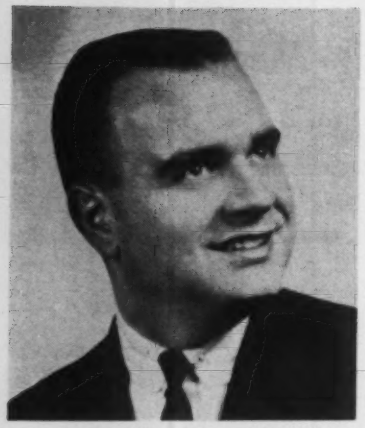
And Optimism—Of course, an upping of salvage value on depreciated machines could completely nullify any help to industry. Modernization would still be balked.

It's Functional—And Inexpensive



MASS-PRODUCED: This numerically-controlled drilling machine is to be mass-produced by Pratt & Whitney Co., West Hartford, Conn. Priced at $8595, the machine is aimed at a broadening market for numerically-controlled machine tools. It's called the Tape-O-Matic.

MEN IN METALWORKING



A. J. Mueller, named president, Mueller Industries, Inc.

Wheel Trueing Tool Co.—D. J. Wallace, named vice president, sales; A. J. Baehr, named sales manager, Detroit Tool Sales Div.; J. E. Slanaker, named sales representative, Cleveland area.

Brillion Iron Works, Inc.—J. W. Volk, named executive vice president.

McLouth Steel Corp. — J. M. Cudlip, named manager, product development; A. S. Simmons, named manager, district office sales.

Basic Products Corp. — C. H. English, named marketing manager, International Div.

R. O. Hull & Co., Inc.—Dr. M. M. Beckwith, named vice president and technical director; P. R. Stuart, named vice president and general manager; Walter Friede, named manager, Customer Service Laboratory.

California Steel and Tube—J. E. Brown, named president.

Continental Can Co. — F. W. Hoover, Jr., named asst. to the president.

Freeport Sulphur Co.—R. C. Hills, elected president.

International Business Machines Corp.—L. H. Warren, appointed director of engineering standards.

CompuDyne Electronics, Inc.—J. H. Bernstein, appointed general manager. (A subsidiary of CompuDyne Corp.)

Durant Manufacturing Co.—W. H. Brown, appointed manager, manufacturing; H. F. Bemm, appointed manager, customer service dept.

H. K. Porter Co., Inc.—R. B. Quinn, named product manager, copper alloys, Riverside - Alloy Metal Div.; W. J. Hunt, named product manager, nickel alloys, Riverside-Alloy Metal Div.

L. P. Struble, Jr., elected a vice president, Dravo Corp.

Hughes Aircraft Co.—W. L. Hoffman, appointed director, administration and material.

Vickers Inc.—E. L. Asch, appointed operations manager, International Div.; D. E. Smith, named director, sales training.

Volkert Stampings, Inc.—E. L. Gerdts, appointed production and development engineer.

Hooker Chemical Corp.—J. J. Usera, named director of sales, International Div.

Philco Corp.—S. M. Berkowitz, named manager, Military Computer Engineering Dept., Computer Div.

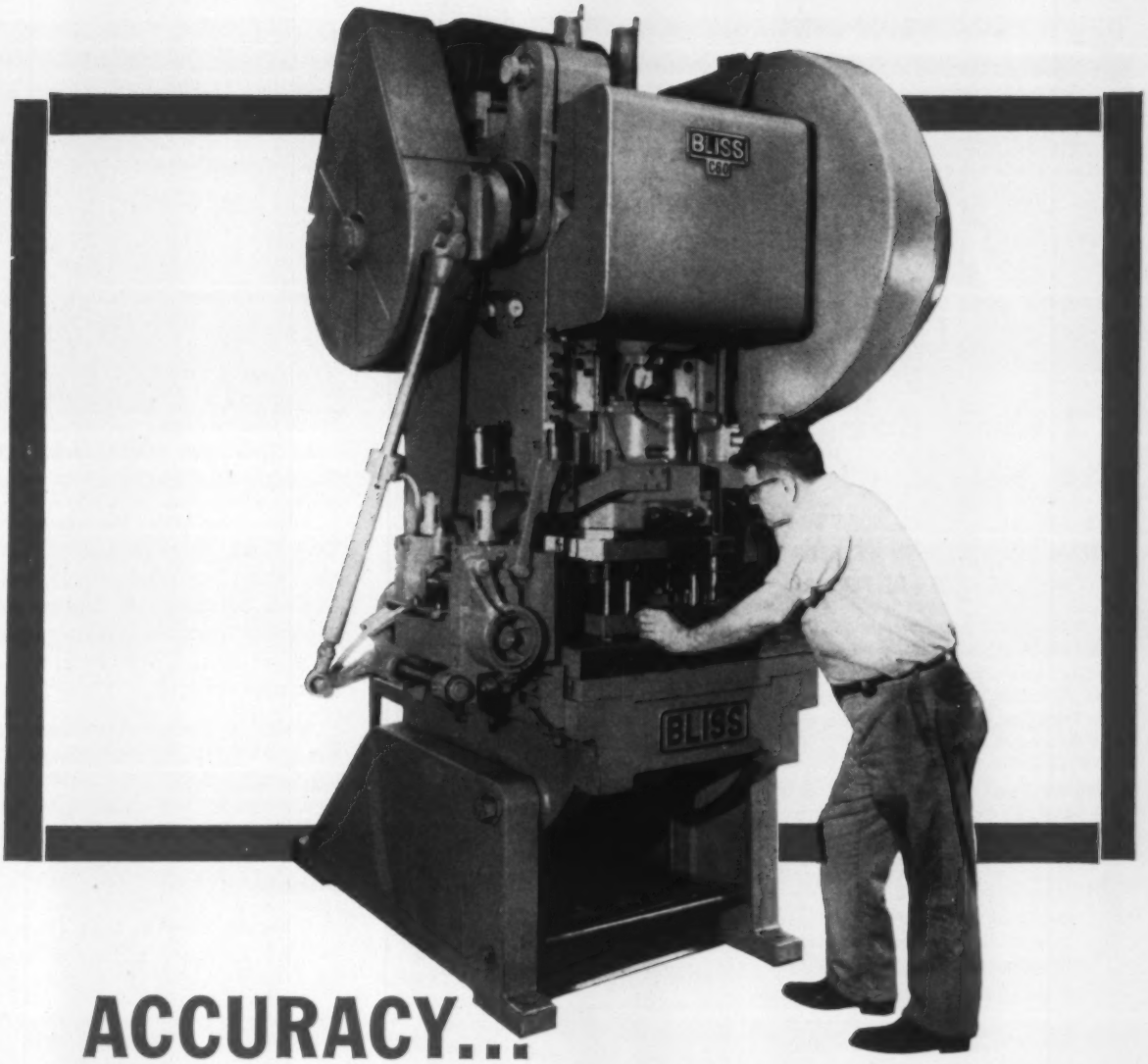
Standard Forgings Corp.—H. W. Campbell appointed general purchasing agent; Raymond Foss, appointed purchasing agent.

(Continued on P. 76)

F. L. Brandt, appointed vice president, Lynn Div., Thomson Electric Welder Co., Inc.

W. B. Browning, Jr., named chief engineer, Armco Div., Armco Steel Corp.

W. B. White, elected vice president, administration, High Vacuum Equipment Corp.



ACCURACY...

that pays off in longer die life, longer press runs before regrinds, with new Bliss Big "C's" and new Bliss "swing-out" portable feeds

The extremely rigid design of Bliss Big "C" inclinables keeps frame deflection to a minimum, even when running at maximum tonnages. What does this mean in terms of actual performance? . . . At Oak Manufacturing Company, Crystal Lake, Ill., eighteen new Big "C" inclinables, equipped with special new Bliss "swing-out" roll feeds, have cut rejection rates sharply. In the case of one very difficult stamping, the rate has improved from 10% rejections down to 1%!

The new Bliss feed is far more accurate than the ones previously used. Moreover, it is designed to swing out away from the press during hand feeding, and can be readily transferred from press to press, regardless of the tonnage (Oak's new Big "C" presses range from 22-ton to 60-ton capacities).

The quality of Bliss Big "C" presses is spelled out both in their strength and, above all, in the precision of their construction, including nearly perfect parallelism between slide and bed, the close tolerances of all working parts, and in the high quality of material in the castings and forgings. Want more facts? Write us now for a complimentary copy of our detailed, full-color catalog.

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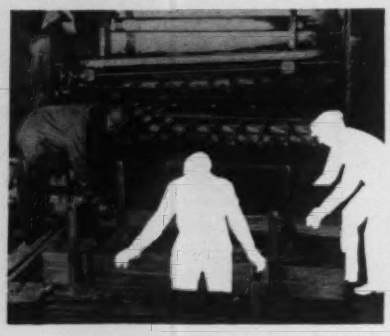

1 man does the work of 3!

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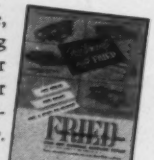

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(Continued from P. 74)

Peter A. Frasse & Co., Inc.— N. L. Hammond, Jr., appointed district manager, New York; H. O. Smith, appointed district manager, Philadelphia; A. E. DeMayo, appointed district manager Buffalo.

Oliver Corp.—V. R. Mullin, appointed Nebraska territory manager.

Macklin Co. — Malcolm Hunt, named asst. to the president.

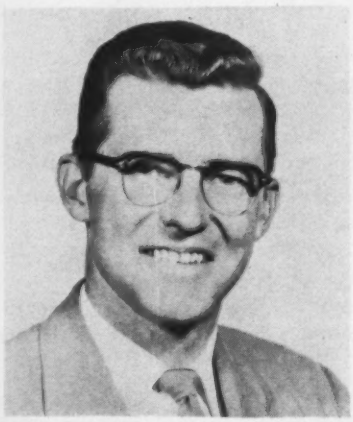
Republic Steel Corp. — E. N. Dekker, Jr., appointed asst. manager, sales, Bar Div.; F. K. Landgraf, Jr., appointed asst. manager, sales, Pig Iron & Coal Chemicals Div.

U. S. Steel Corp. — R. W. Grubbs, appointed asst. director of purchases, National Tube Div.; M. K. Reckord, Jr., appointed asst. manager, sales, Chicago; R. F. Dorrell, appointed advertising manager, American Steel & Wire Div.

Jones & Laughlin Steel Corp.— J. B. Gibson, appointed district sales manager, Houston; W. F. Ewart, Jr., named asst. to the manager, tubular products sales; K. H. Waldmann, appointed asst. to the manager, tubular product sales.

Air Reduction Sales Co.—C. J. Langley, appointed manager, Philadelphia district; S. N. Peters, appointed plant superintendent, Johnstown, Pa.

Hubbard & Co.—G. C. Wright, appointed marketing manager.



A. D. Fentzke, appointed product manager, technical sales, Refractories Div., Babcock & Wilcox Co.

A. J. Scheid, elected president, Columbia Tool Steel Co.

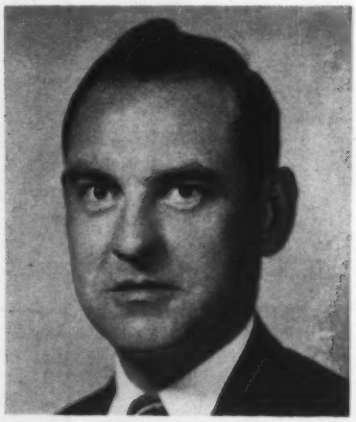
Allis - Chalmers Manufacturing Co.—P. M. Nevels, appointed manager, Farm Equipment Div. branch, Billings, Mont.; J. E. Brinkmann, appointed general superintendent, electrical depts., West Allis Works Industries Group.

Black & Decker Manufacturing Co.—G. H. Porter, appointed director, marketing services.

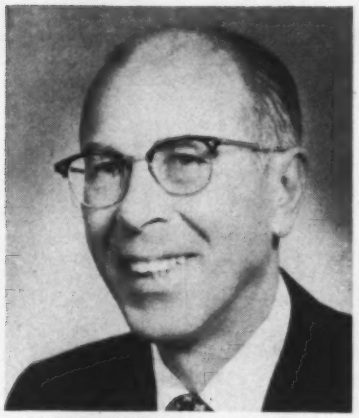
Quaker State Metals Co.— J. B. Gage, appointed special products manager.

Colorado Fuel & Iron Corp.— W. W. Leonard, appointed manager, tubular sales; D. W. Kelly, appointed asst. to the manager, tubular sales.

Bethlehem Steel Co. — A. W. Connar, named general purchasing agent.



J. J. Meder, named manager, Government Marketing Div., Acme Steel Co.



E. J. Doolittle, appointed product sales manager, cutting and forming equipment, Industrial Equipment Div., Baldwin-Lima-Hamilton Corp.

Keuffel & Esser Co.—N. B. Weir, appointed manager, Philadelphia branch.

Seng Co.—J. E. Petersen, named works manager.

Fairmont Aluminum Co.—L. M. Campbell, named manager, sales administration; A. J. Snider, named manager, field sales.

Crane Co. — Blayne Salyer, appointed product publicity manager.

Chase Brass & Copper Co.— R. C. Gilson, named warehouse division sales manager, Cleveland.

Bunting Brass & Bronze Co.— E. T. Blackney, named head, precision plating dept.

Electric Welding Co. — J. F. Hopper, appointed sales manager.

American Motors Corp.—W. A. Kancian, named asst. works manager, Milwaukee Body Plant.

Bowman Steel Corp.—C. L. Wilson, appointed sales manager.

OBITUARIES

H. R. Moorhouse, 58, executive vice president and treasurer, Arthur G. McKee & Co.

H. J. Daly, 64, vice president and director, Norton Co.

W. A. Humel, 66, vice president and general manager, Park Drop Forge Co.

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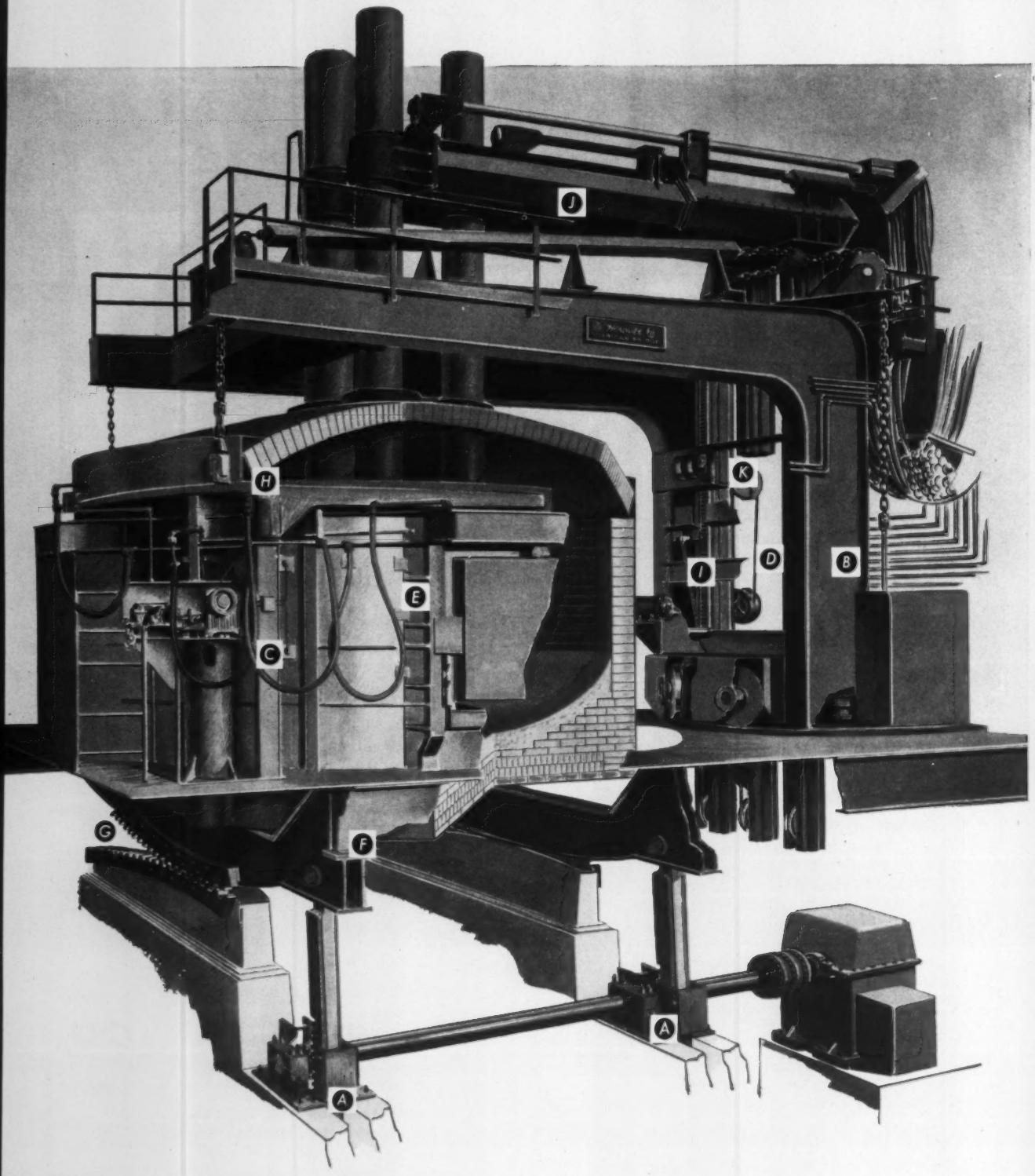

This mark tells you a product is made of modern, dependable Steel.

with a Heroult Electric Furnace

You can increase your steelmaking efficiency and get better steel in the bargain with a Heroult Electric Arc Furnace. Here's why: Heroult Furnaces heat fast — make more melts per day. Heroult Furnaces lower costs through high yields per heat and small scrap losses in charging. And, Heroult Furnaces improve steel quality by reducing sulfur and phosphorous content.

If you're looking for performance, efficiency, economy and low-cost maintenance, consider these features:

1. Heroult Furnaces are 100% mechanically operated. Including **(A)** heavy rack-and-pinion-type tilting mechanism, **(B)** motor-driven, rotating, jib-type roof swing, **(C)** winch-operated, water-cooled, jib-type door-lift mechanism, and **(D)** high-speed, electro-mechanical electrode-positioning mechanism.

2. Cage-type shell construction with shell plates loosely attached **(E)** to heavy supporting structure. This construction minimizes shell warping and allows easy replacement of damaged shell plates.

3. Operating mechanism independently supported. The tilting platform on which all operating mechanisms are supported is attached directly to the rockers independent of the shell structure **(F)**. Thus, operating mechanisms are unaffected by shell distortion.

4. Water-cooled, Skew Back Roof ring. This feature **(H)** eliminates the need for special skew-shaped roof refractories.

5. Electrode Mast Safety Device. This spring-loaded, rack-and-pawl-type device **(I)** provides positive protection against damage resulting from electrode winch cable breakage.

6. Square-section, Water-Cooled Electrode Mast Arms. This design **(J)** guarantees a rigid connection between mast and mast arm, thus helping to maintain proper electrode position.

7. Remote-Controlled Electrode Clamps. This device, of the spring-clamp, air-release type, is located inside of the rear section of the water-cooled mast arm where heat cannot affect it.

8. Square-Sectioned Electrode Mast. This design feature **(K)** developed by American Bridge, assures proper guiding and electrode positioning.

9. Rockers. The heavy fabricated steel curved top and bottom rockers **(G)** minimize forward travel during tilting. These rockers are designed so that the furnace will tend to return to horizontal position from any degree of tilt.

American Bridge constructs Heroult Furnaces for all types of arc melting, in charge capacities from 6,000 lbs. to 400,000 lbs. with shell sizes ranging from seven feet up. They are equipped with roof-removing mechanism for fast top charging. They can be furnished with a non-magnetic shell bottom section to accommodate induction-stirring equipment. Gantry-type top-charge furnaces, door-charge furnaces and special furnaces for duplexing and non-ferrous melting are also available. Your crew can easily maintain a Heroult Furnace. Check American Bridge's complete design, construction and installation service.

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USS

Engine Handling

MADE EASY IN NEW GIANT TEST BUILDING

Some of the many test cells served by easy rolling Cleveland Tramrail hand-propelled cranes with electric hoists of two and four tons capacity. Note the white glazed tile walls that aid in keeping the entire test area immaculate.

As a leading manufacturer of automotive diesel engines in the United States, powering more on-highway trucks than all other U. S. diesel builders combined, Cummins Engine Company, Inc., Columbus, Indiana, is continually improving and expanding its facilities to insure the highest quality of workmanship. The firm's new 300,000 square foot Test Building was a move in that effort. It was designed primarily for engine testing and provides the most modern facilities in the diesel industry.

Cummins has had long, favorable experience with Cleveland Tramrail equipment in many of its hard-working shop areas. This was an important consideration in its selection for the new Test Building. All individual engine test cells, plus the larger cells for testing marine engines, generator sets and power units, are equipped with individual Tramrail cranes. Other areas of the building were also provided with many Cleveland Cranes.

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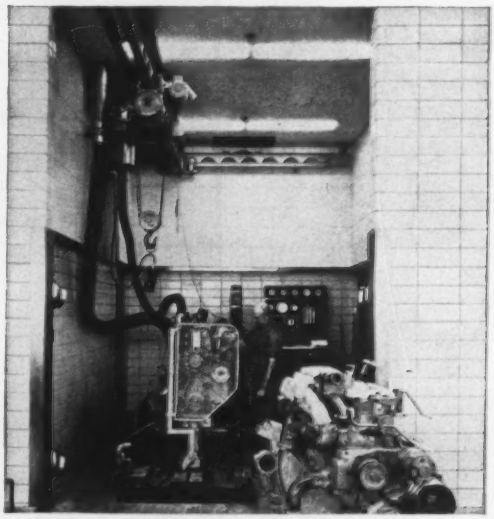
Overhead Materials Handling Equipment



There is no delay in handling engines in and out of a test cell. The man in each cell can take care of this easily and immediately whenever desired with the crane in the cell.

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 4864 E. 290 ST. • WICKLIFFE, OHIO

Industry Offers Answer

A nonprofit corporation, owned by companies engaged in worldwide communications, may eventually own and operate the satellite communications system. A special industry committee made the proposal for this Space-Age corporation to the FCC. Rates would be regulated by the FCC. The corporation would be headed by three directors appointed by President Kennedy, along with two directors from each company.

What Next for Computers?

Scientists at Lockheed Missiles and Space Co., are working on a new kind of arithmetic. Called "modular arithmetic," it promises to make computer operations 20 times faster. With ordinary arithmetic, the computer must wait for the "carries" to catch up with the main calculation. The new system converts a problem to algebra, solves it, and turns the answer back into numbers.

Probes Tungsten, Boron

At least one manufacturer of electronic equipment believes that it has neutron generating tubes that could be used in nondestructive test units economically. Neutrons could be useful in probing lead, tungsten, boron and lithium. These materials allow little X-ray penetration. The neutron tubes can also check standard metals.

Space Speedometer is Goal

One of the most interesting projects in the Franklin Institute Lab is the study of a space speedometer for the astronaut of the future. The template spectroscopy method, using the Doppler principle, may hold the answer. This method uses a photographic negative of the spectrum of a source of light at rest. This is matched with the source of light in motion. The difference is a measure of relative velocity change.

Ranger's Tooling Up

Magnesium will see extensive use in the structure of Rangers 3, 4 and 5. The main chassis boxes, heaviest items on the spacecraft are machined from magnesium tooling plate. The lightweight metal will also make up the six support legs, an interconnecting structure which links the hex-shaped omnibus to the impact capsule and an adapter ring for the omnidirectional antenna.

Talk About Response

A rugged servomotor may soon get a role in space. Already it has graduated from machine tools to control antenna arrays. Developed by Cimtrol Div., Cincinnati Milling Machine Co., its useful properties include a controlled speed range of 30 million to 1—from 500—1/60,000 rpm. From 100 rpm, the motor can stop, reverse direction, and accelerate to 100 rpm again—all in 0.0015 seconds.

Nuclear Power Pack

This nuclear-thermoelectric power system may soon be on its way to the moon. The system, developed by Westinghouse, produces 50-60 kw. Special long-life isotopes can extend the system's life to five years on the moon's surface. The curved shields are waste heat radiators. Heat is transferred by a liquid metal. The power package is also feasible for oceanic weather stations.

LIQUID METAL: Transfers heat.

Heat Treat Holds Answer

Three full-scale rocket motor cases made of forged vacuum-remelted H-11 steel were pressure-tested to destruction by Pratt & Whitney. The final case, improved by heat treating, burst at a hoop stress of 285,000 psi. The program shows that high-strength cases can be fabricated from steel heat treated to 240,000 psi yield.

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Representatives in principal cities. Check: THOMAS', MacRAE'S, CONOVER-MAST, FRASER'S, SWEET'S FILE.

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Computer Puts Production Runs Into Orderly Machining Plan

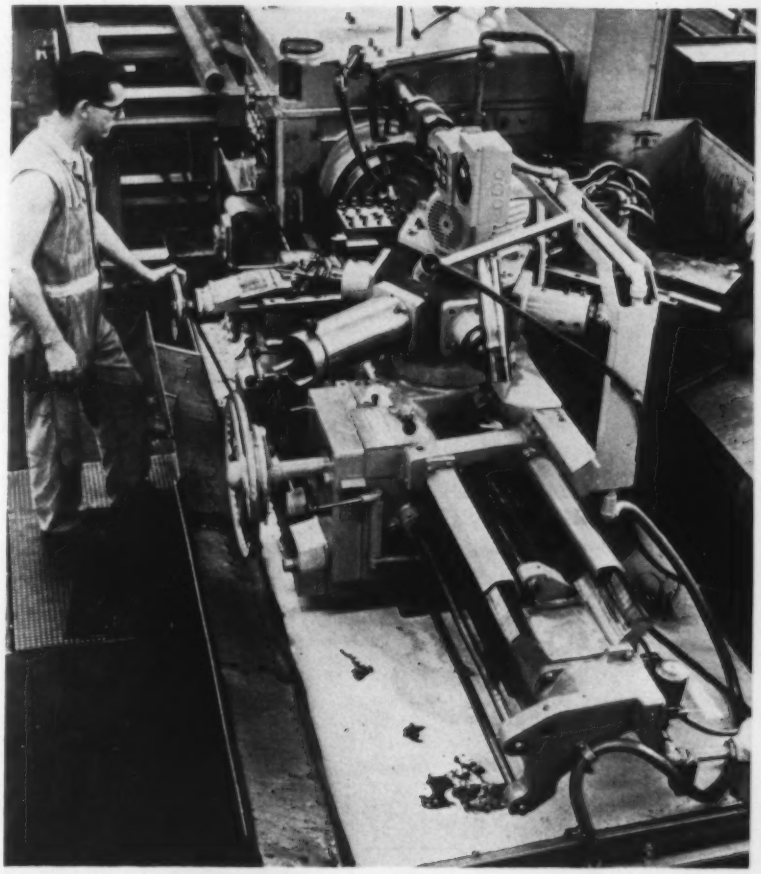
Any company that makes a wide range of bearings is bound to face production problems.

The solution lies in tight scheduling of highly efficient machine tools.

■ "You cannot build today's products with yesterday's machines and still be in business tomorrow." You'll find that slogan in the office of C. A. Laase, assistant chief engineer-mechanical, at Timken Roller Bearing Co., Canton, O.

Production at Timken runs along at an extremely high level. There are probably many reasons for this fact. An important tool used by the Timken Co. in its effort to maintain high production is an IBM 650 computer and a highly integrated data processing system.

The company also insists on using modern, but standard machine tools as the work-horses in its Roller Turning Dept. With them, Timken can apply the "cascading" theory to its production. In other words, roller jobs of the same diameter, but requiring only a slight change in taper angle or OD radius, are scheduled to follow one after the other.



MODERN TURRET LATHE: Sophisticated tool machines the larger size rollers up to 6 in. diam in production runs ranging from 75 to 600 parts.

Private Eyes — The engineering team watches the performance of its machine tools like hawks. As soon as a certain machine shows abnormal signs of downtime and maintenance, a decision is made: To rebuild or to replace?

The decision to replace is one reason for the new look in the Roller Turning Department. There you'll see a new saddle-type turret lathe and two specially tooled single-spindle bar automatics. Both units were built by The Warner & Swasey Co., Cleveland.

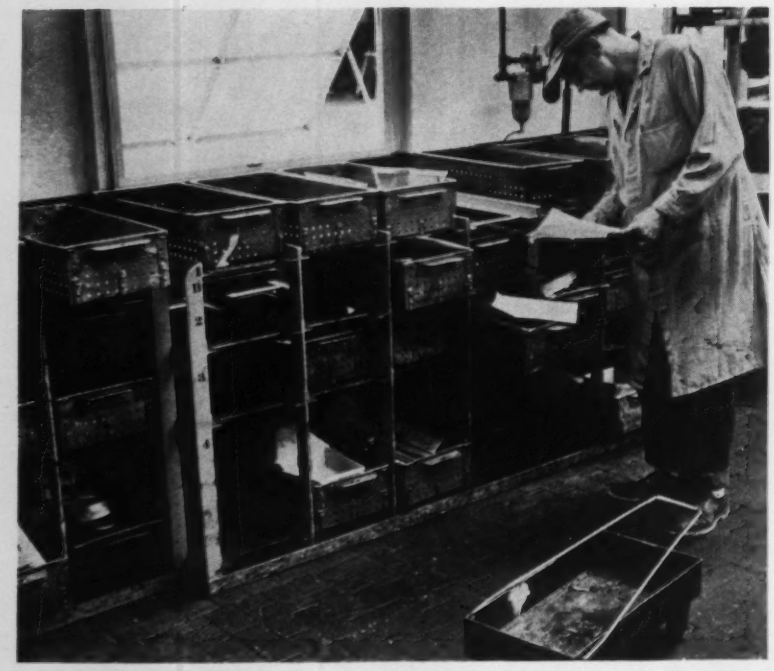
Total annual production of tapered rollers from these three machines averages about 300,000. The turret lathe is responsible for 25,000 of this total. During a typical working month of three-shift operations, the 2AB automatics handled 12 different roller jobs, while the 3A lathe worked on six jobs.

In time, the new machines are expected to replace 11 older models. These include nine single-spindle bar automatics and two hand turret lathes.

Looking Ahead—Scheduling machines for maximum efficiency is the responsibility of the Production Planning Dept. The first of each month the computer prepares a manufacturing schedule for the next month. At the same time, it adjusts current schedules.

The computer is programmed to

CASCADING THEORY: Slight cutter adjustment on turning tool gets the single-spindle bar automatic ready for a smaller size roller.



LOADING THE TRAY: The required tools and cutters are taken from the storage rack, placed on the tray and delivered to the machine area.

prepare a realistic manufacturing schedule based on available inventory, orders on hand, existing manufacturing schedules and the level of current shipments. All of this information remains available in the computer and is the basis for issuing daily production reports.

Factual Data—These reports list schedule balances, in-process inventory and location of inventory. The Production Planning Dept. receives this report each morning. The report is used by production schedulers in loading machines. Machines are loaded 24-48 hours in advance of the time the work is to be done.

The number of determinations must be made before the machines are actually loaded. Since all machines are operating, the scheduler must first determine when additional machine capacity will be available. Next he must know if or when material will be available. He must also know the status of tooling.

Data on material availability and machine capacity are on hand in the Production Planning Dept. The scheduler now prepares a "set-up" card which is a notice of intent to produce a given part number. This card, indicating which machine is to be scheduled, is sent to the tool crib for the tooling status for this part number.

Changes in Tooling—The crib attendant then determines if a change of machine parts such as feed-change gears is needed. If so, he places the machine parts required on a tray. The required tooling is then placed on the same tray.

Now that both the machine parts and tooling are available, the Production Planning Dept. is notified that this part number is now scheduled to be produced on a specific machine.

The Timken Co.'s goal is to provide better service to its customers. Modern machinery and advanced scheduling techniques are working to this goal rapidly, despite the fact that the company offers a product

TOOL STORAGE: Cutter block is preset on the cross-slide tool holder. Assembly is then placed in the tray.

CHECKOUT POINT: Tooling for a later run is checked out against the order in machine parts storage.

line of more than 15,000 items.

The Warner & Swasey saddle-type turret lathe is equipped with cross-slide contouring and special gun drill with speeder. The 2AB automatics are tooled identically. Both of them have special retractable taper-turning tools and gun drills with speeders.

Varied Workload—The machines are handling tapered rollers in lot sizes from 75 to 600 on the turret lathe, and from 200 to 5000 on the automatics. The diameter range for the automatics is 1¼ in. to 3 in., while the lathe handles the 2⅝ in. up to 6 in. diam range.

The Old Technique—Formerly, hand turret lathes with taper attachments, high-speed steel drills and reamers, were used to machine the larger rollers, the ones up to 6 in. diam. Two chuckings were involved. The holes were drilled only part way through in the first chucking. Then the parts were turned around and completed in the second chucking.

QUALITY PHASE: The foremen in the Roller Turning Dept. examine the first production piece from a new run for accuracy and quality.

High-speed steel tools were used, but the process was still slow. Rollers are still machined from Krupp steel, a high nickel alloy which is about equal to 3311 steel.

With the new machines, there's added horsepower coupled with higher spindle speeds. Also, premium grade carbide cutters are used. As a result, surface speeds have been increased from a maximum of 110 sfpm on the older machines to 475-550 sfpm on the new models.

There's an increase in feeds, too. For turning cuts, feeds are up from 0.010 to 0.015 ipr, while form cuts have been increased from 0.003 to 0.006 ipr.

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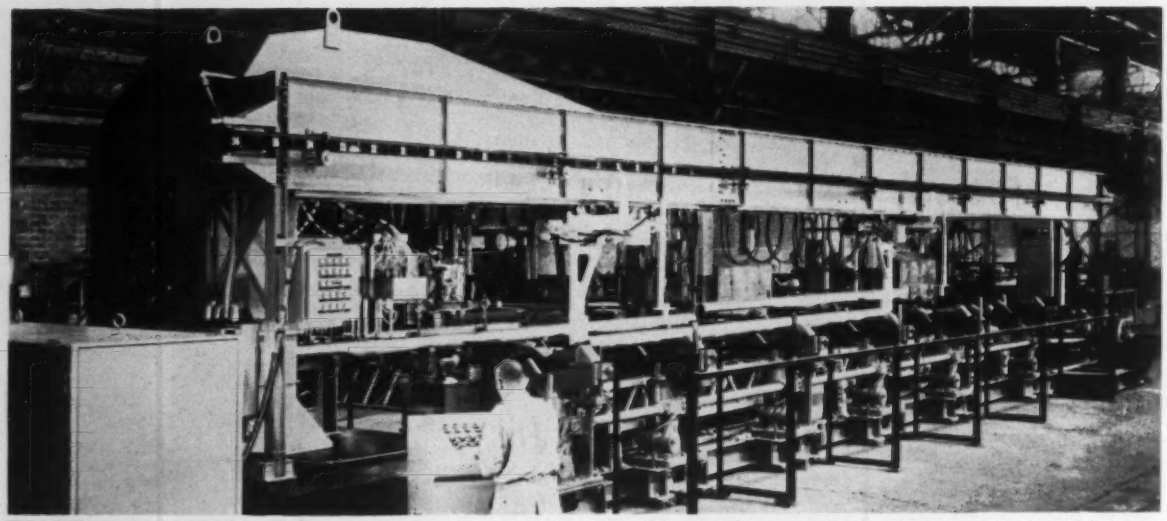


SHAKE-DOWN RUN: Fully-automatic pipe-processing machine undergoes checkout tests prior to shipment.

System Classifies Pipe in Mill

Automated all the way down to its lubrication system, a pipe classifier weighs, measures and codes oil-line pipes.

Only one part-time attendant is needed to handle this unit.

■ An automatic system is slated to replace manual data-gathering and coding methods for line pipes and casings at a major steel mill.

Using modular-design concepts, this system weighs, measures and codes heavy oil-field pipes and casings. A built-in computer counts total pieces, calculates weight-per-foot values and triggers an electronic read-out printer.

All of the new system's design features are combined in a machine that's 65-ft long. This machine is a product of the Baldwin-Lima-Hamilton Corp., Industrial Equipment Div., Philadelphia.

Wide Potential—Adrian Phillips, automation consultant to B-L-H, reports: "Other potential uses for this basic system include data-processing and coding of various tubular- and flat-mill products.

"The new system is a major step toward full automation in pipe mills," he adds. "It's faster and more accurate than present manual-inspection and tallying methods."

Handling pipe in lengths to 50 ft 2 in. and from 4½ to 10¾ in. OD, the new machine processes each pipe section in 18-36 seconds. At the same cyclic speed, it classifies and codes casings from 4½ to 9⅝ in. OD, in lengths from 15 ft 10 in. to 50 ft 2 in.

The weight of these pipes and casings varies from 80-2,999 lb. Six B-L-H null-balance load cells yield electrical signals which are proportional to every section's weight. Running totals and individual records are printed out at the console.

No Guesswork—Only one part-time attendant is needed. Normally, crews of four to eight men serve at every weighing, measuring, tallying and coding station. Thus, by freeing these men for other production jobs, the machine will pay for itself in a few months.

All instrumentation, developed especially for steel-mill conditions, takes the form of building-block modules. Relays, visual digital read-outs, programming switches and other electro-hydraulic controls are sealed in heavy-duty plug-in cases. The Telechrome Mfg. Corp., Amityville, Long Island, N. Y., is the brains behind these controls.

Plug-in design keeps maintenance costs down. Without any special tools, regular mill operators can remove and replace instrumentation.

Trouble sources are pinpointed at the control console. A telltale board locates bottlenecks instantly. Indicator lights sequence automatically with each weighing, measuring, computing and recording cycle. If there's a malfunction, these lights identify the faulty unit. It's merely unplugged and replaced.

Conveyor Fed—Pipe enters the system on a synchronized transfer conveyor. Loading arms lift each pipe into the first station. Here, it's supported for length measuring, weighing and counting.

Feeler arms move up against the pipe ends. When they contact the pipe, a differential servo system translates the distance which the arms moved. This distance is fed to the computer in the form of a proportional-length electrical signal.

The computer accepts or rejects

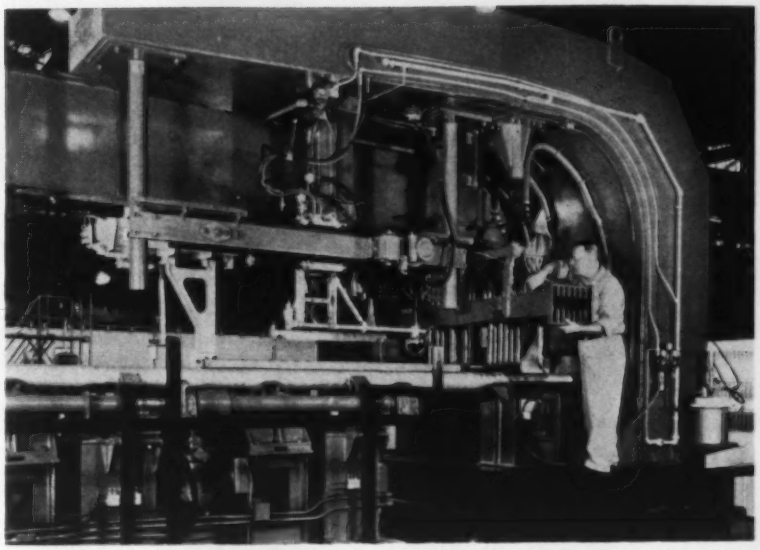
the pipe after it receives proportional-weight signals from the load cells. While the pipe is still in the data-gathering station, the computer calculates weight-per-foot values. Only those pipes that meet the American Petroleum Institute code get the okay at this station.

The memory device uses mechanically-locked contacts. They correspond to fixed disk patterns at the time of coding. Every disk pattern transfers mechanically in the analog-to-digital computer.

Fast Count—Mechanical transfers free the input shaft so that it can continuously follow measured variables, except during the brief period of solenoid actuation. Encoding rate is 20,000 counts per second.

After the pipe is counted, it moves to the second station. Here, stenciling or paint coding is effected. An overhead, air-operated platform automatically swings into position. Actuated by a 60-110 psi air supply, this paint stencil marks the weight, length and other API spec data on every pipe section.

A memory device permits processing of two pipes at the same time. While one pipe is being coded, another is being gaged at the shock-proof data-gathering station.

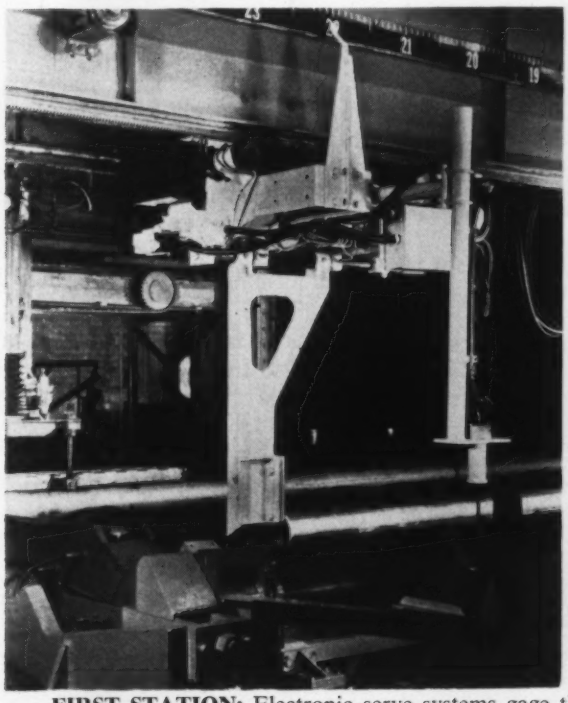


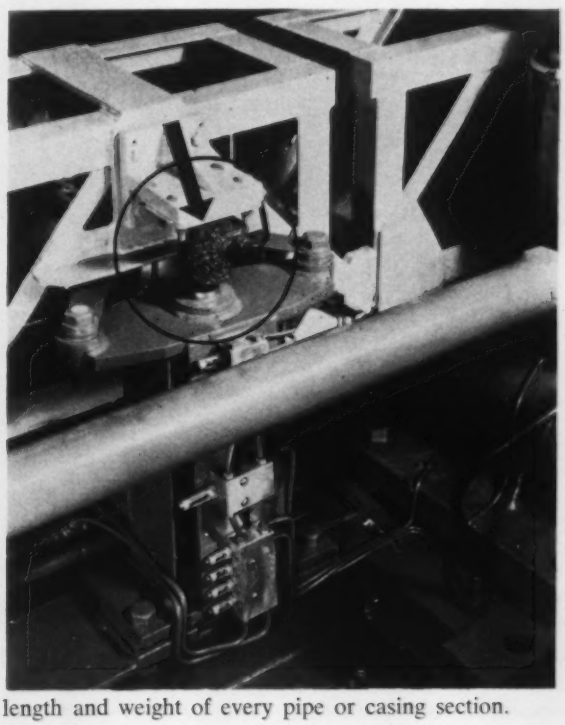
STENCILING STATION: After the computer calculates length-per-foot measurements for each pipe or casing, the "passed" section is coded.

Rejects—When the fully-transistorized computer finds a pipe which doesn't comply with API specs, the system automatically shuts down. Immediately, a visible, audible alarm signals the part-time operator.

Electrical signals can be preset for a fixed count, a desired total weight or a certain total-length count.

The automatic recorder turns out up to nine printed copies of all tabulated data. These records meet the needs of inventory control, accounting, order control and other administrative departments.





FIRST STATION: Electronic serve systems gage the length and weight of every pipe or casing section.

How Non-Chemical Explosions Shape Hard-to-Form Metals

Explosive forming can solve many design headaches; but it doesn't fit on the shop floor.

Powerful capacitor-discharge units yield the same benefits right on a production line.

By **W. N. Redstreake**
Automation Editor

▪ An electro-hydraulic process introduces some entirely-new metalworking concepts. Controlled ionic power, transmitted through a fluid medium, can be used to form, weld, bond and pierce both production and single-shot research parts.

Operating on 110-v ac/dc power input, the first commercial capacitor-discharge unit "explodes" almost unlimited amounts of energy. This raw energy can even be used to reorganize the molecular structure of metals and other solid materials.

In converting an initiating filament or foil band to plasma form, banks of capacitors release up to 1-million amp. Physical limitations range to 25,000°C, with forming pressures up to 500,000 psi.

LOW-VOLTAGE INPUT: Pushing a button, a technician "fires" 110-v current into a bank of capacitors. The capacitors trigger a non-chemical explosion between two electrodes, attached to a heavy steel cabinet.

Power to Spare—What's the principle behind this versatile metalworking tool? Let's check with R. H. Wesley, executive vice president of Electro-Hydraulics, Inc., Dallas and Fort Worth, Texas.

Dr. Wesley is the man who developed this powerful capacitor-discharge machine. He states: "In essence, the electro-hydraulic effect results from a sudden release of electrical energy through an initiating filament or fixed gap."

Electrodes are connected to the initiating material. The type, gage, length and shape of the initiating material hinge on several factors. These include the size of the workpiece, the female die's complexity and the results desired.

Fluid Coupling—When activated, the initiating material becomes a channel of plasma. As this plasma expands against a fluid-transmission medium, its inertia creates pressure buildups up to 500,000 psi. The initiating material also adds intensity to each pressure-wave release and controls the path of the multi-stage pressure waves. This insures uniform wave fronts.

Normally the discharge occurs in a suitable fluid medium. The fluid is used to transmit the shock wave set up by the electrical discharge. In metalforming setups, this shock-wave moves a workpiece against a female die. Shaping takes place within 7-12 microseconds.

The velocity imparted to the work by each fluid-pressure wave is about 4 km per sec; but the speed of the shock wave is much higher. Calculations show it's about 9 km per sec. Thus, EHI's 15,000-joule unit yields 500,000-psi or 30,000-

atm vacuum pressures.

Easily Controlled — Electro-hydraulic forming fits into existing production lines. It operates inside a plant. This means the process can be automated and coordinated with other equipment. There's no disturbing noise. And you don't have to stock perishable, dangerous explosives.

All of the short-span high-load shock waves are precisely controlled. Within limits, the forming speed is varied by altering the distance between the workpiece and the discharge point. To obtain a desired forming speed, you merely plot a point on a sloped curve to pin down this distance.

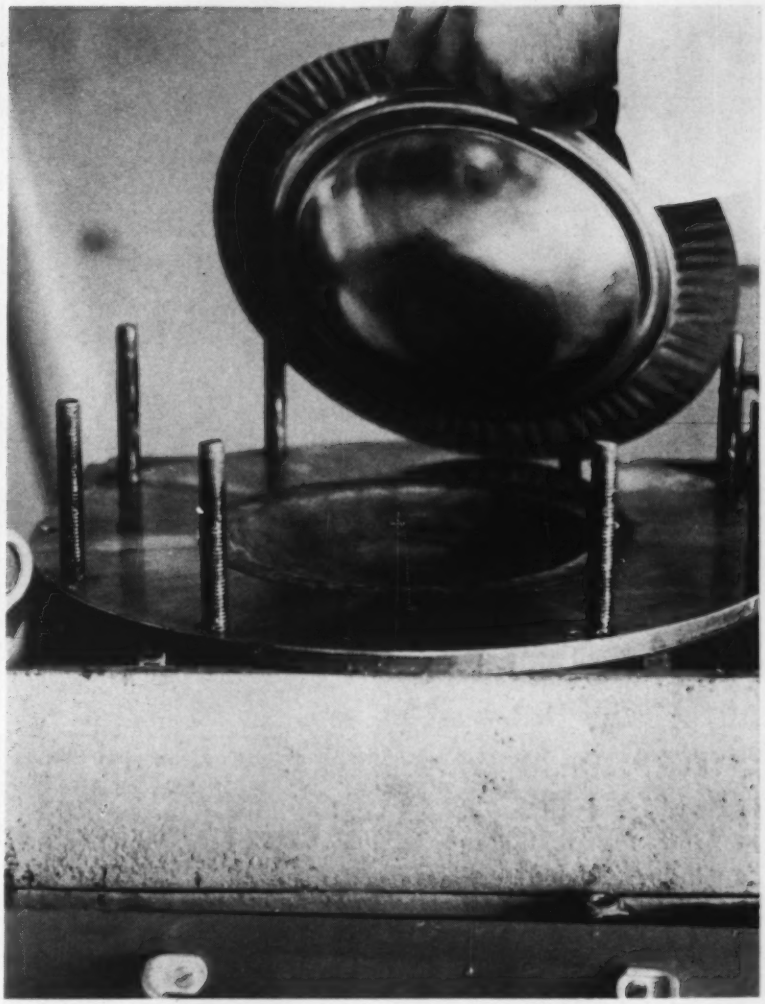
Dr. Wesley says that any metal that can be formed can be shaped electro-hydraulically. Aluminum and stainless steel alloys are formed with fine details and precision. Exotic materials also lend themselves to capacitor-discharge forming.

Drawing Operations — "We've formed titanium, beryllium and columbium," says Dr. Wesley. While discussing exotic materials, he cites the capacitor-discharge unit's role in drawing ultrahard metals. "Titanium, 0.009-in. thick, has been successfully drawn with no springback or wrinkling."

Actually the limitation in shaping most materials, including ceramics, centers on their inherent characteristics. With metals, work hardening, yield strength and maximum elongation are prime factors.

Dr. Wesley's machine operates on a principle which has been known to scientists for three decades. He states: "Capacitor-discharge reactions have been used for years to trigger other reactions. But no work beyond theory was ever done on the possible value of the explosion itself."

Years of Effort—Back in 1957, while a member of General Dynamic's Convair research team, Dr. Wesley began work in this area. His major objective was to find a way to trigger non-chemically created shock waves. He says it wasn't until just recently that ". . . I became aware of capacitor discharge's full potential."



HOT AS THE SUN: Capacitors release up to 1-million amp to convert a sacrificial filament into hot plasma. All shock waves are transmitted through a fluid medium. Forming pressures range up to 500,000 psi.

Since it's essentially linear, the EHI method can produce parts similar to those turned out by chemical explosions. Non-chemical forming-pressure waves shape, emboss, blank, flange or plate, simultaneously or separately. Steel parts as big as an automobile body can be formed with a single electrical blast.

Other metalworking uses for the capacitor-discharge unit include: Bearing impregnation; bonding dissimilar metals; strengthening conventional cutting tools; and cladding ceramics on metal surfaces.

Bearing Bonus—Here's the procedure for treating a bearing surface. First the bearing is immersed in a suitable lubricant. Then the initiating filament is positioned so the bearing's surface receives the maximum intensity of the shock wave.

In this case, treating time takes a few seconds. After treatment, the bearing can be used immediately. And it will wear five times as long as an untreated bearing.

There are no moving part in the capacitor-discharge unit. It's charged to maximum power in only six seconds. This means the only delays are loading and unloading of the workpieces and positioning of a single die. Naturally, these operations can be automated.

SMOOTH AND STRAIGHT: Hydraulic cylinders are vital components in most special machine tools.

Key Factors Affect Reliability Of Hydraulic Machine Tools

By **L. P. Gajda**—Vice President-Engineering, Snyder Corp., Detroit

Hydraulic systems are in demand on special machine tools. Designers know electro-hydraulic controls shave costs.

What about reliability? A few simple pointers can give you full-dollar value.

■ Reliability means different things to different people. To the designer and builder of special metal-cutting machine tools, the definition centers on the ability to sustain output levels of 70-80 pct of peak capacity. These levels must be maintained for a one-year period with no component failures.

Machine tool builders consider this strict reliability factor more than just a definition. In fact, it's often a contract obligation.

Special Headaches—If you check the conditions under which most special machine tools are conceived, purchased, designed, built, installed, serviced and maintained, it's a wonder this contract obligation is met. Sometimes it isn't.

All machine tool builders know their equipment must give many years of reliable service beyond a contract agreement. Otherwise, they'll soon be out of business.

The desire of the entire metal-working industry to put reliability on a factual basis is a sound approach. It's welcomed by most builders of special machine tools.

Of course, reliability and low machine costs don't always go hand-in-hand. The use of a few low-cost hydraulic components in a machine tool's control system may reduce overall expenses. But the sucessful bidder must avoid components with low reliability ratings.

No Room for Error—Purchased parts represent about 30 pct of a special machine tool's total costs. These parts include: Fasteners, bearings, seals, and hydraulic and electrical components.

Hydraulic and related electrical controls average 20 pct of a machine tool's total cost. Thus, the design of special equipment hinges

to a great extent on the reliability of hydraulic components.

Hydraulically-operated control systems are specified for the majority of special machine tools. This means both designers and users have faith in the reliability of electro-hydraulic components.

Keep Competitive — Who's responsible for reliability in the finished equipment? The designer often bears the brunt of the burden. But in today's tight machine tool market, his desires may have to be modified. Otherwise, a company can't quote and build on a competitive basis.

Too often, reliability suffers under these buyers' market conditions.

In making a reliable machine tool, there are several areas of responsibility. The builder holds component suppliers responsible for the reliability of purchased items. From the user's point of view, responsibility for the finished equipment—including design components—rests chiefly with the builder.

User's Role — Over the years, special machine tools and their control systems have become quite complex. As a result an area of responsibility now surrounds the user. Maintenance and operating procedures play crucial roles in obtaining optimum reliability.

In effect, overall responsibility must rest on a trio of shoulders. This troika consists of the component supplier, the machine tool builder and the end user.

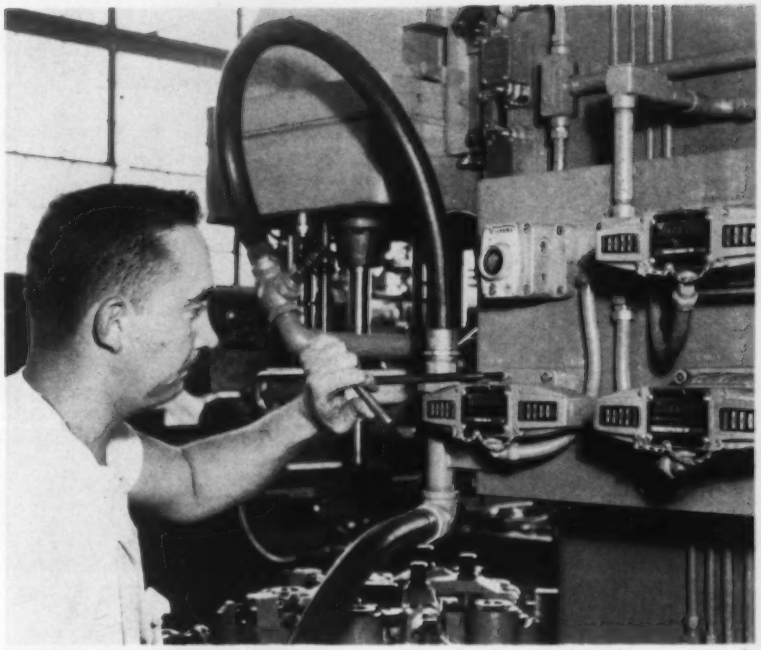
How reliable are hydraulic components? Let's study field results. Recently, automakers rebuilt a great many machine tools. This allowed machine tool builders to gage the condition of hydraulic systems which had operated successfully for many years.

Hydraulic cylinders with 10 years of service were checked out. By just adding new seals, these cylinders were put back into first-class condition. Then they were installed on the rebuilt machines.

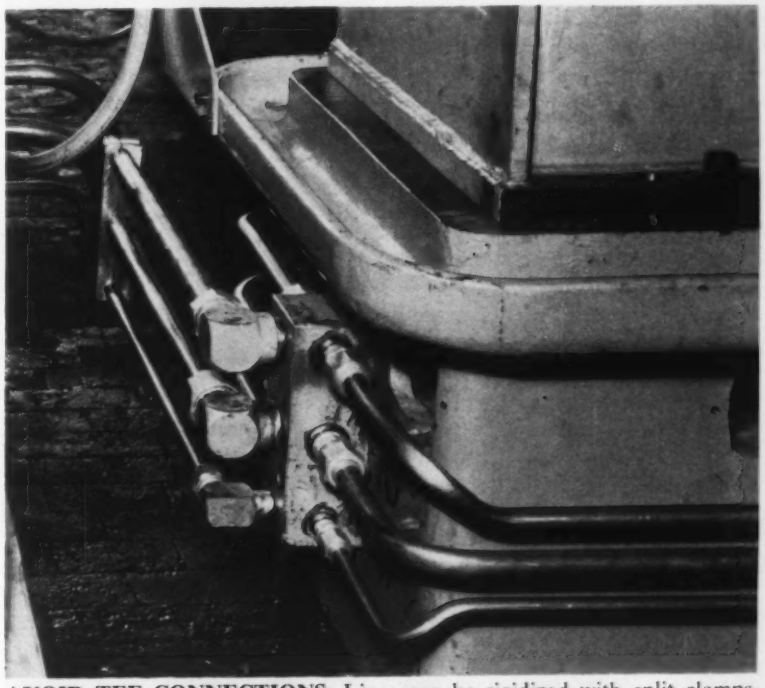
General Rules — Here are the general requirements for reliable hydraulic cylinders. They must have smooth, straight, hardened rods; their scrapers must keep dirt out of the cylinders; and there has to be good alignment between each cylinder and rod.

Snyder Corp.'s engineers have examined valves that operated on machines for more than 15 years. All these valves needed were cleaning and new seals.

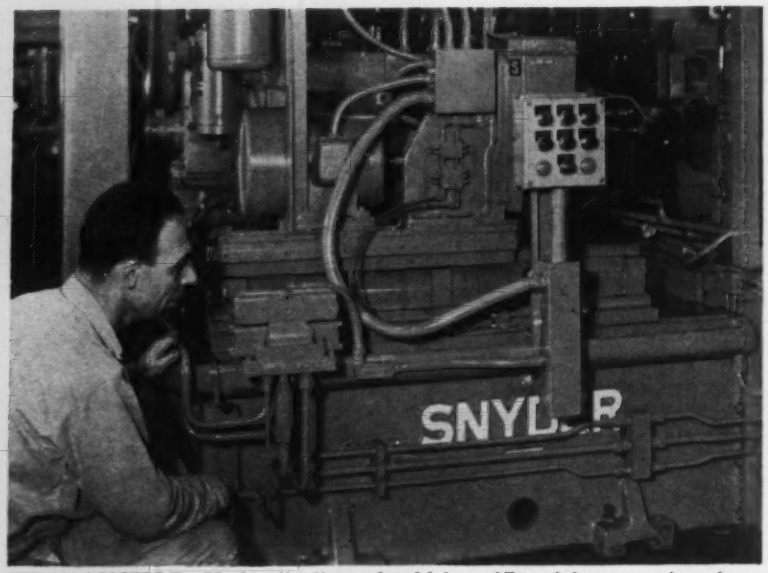
What about faulty and short-lived valves? Usually poor-quality hy-



SIMPLE MAINTENANCE: The mounting of valves and feed-rate controls on panels provides a manifolding method to simplify valve replacements.



AVOID TEE CONNECTIONS: Lines can be rigidized with split clamps.



FIRM ANCHOR: Hydraulic lines should be stiffened by strapping them. Distribution blocks allow easy-to-assemble short-line connections.

draulic fluid is the source of valve troubles. It's also the culprit behind most sticky valves.

Misapplications and/or overloads also cause valve problems. Solenoid burnout occurs in such cases.

Electrical Contacts—Relays and limit switches can withstand up to 7,000,000 cycles before any reliability problems crop up. Burnouts, caused by overloads or failures due to dynamic forces, are almost nil in proper applications.

Here at Snyder Corp., we've seen hydraulic pumps that only needed cleaning to be put back into first-class condition after 10 years of service. Pumps are rarely a source of reliability problems—if good hydraulic fluid is used and the pumps are run at specified pressures and speeds. Of course, the hydraulic fluid must be kept clean.

Cleanliness of hydraulic fluid should be emphasized in regard to both valves and pumps. We recommend that a strainer and a full-flow oil filter be installed in the system. And don't forget to select and maintain the proper fluid.

No Leaks—Now, let's talk about leaks. Non-leak operation is a must. Most hydraulic line fittings won't leak if they're properly installed. On close spacing, it's important that these lines be tied down.

Any reputable machine tool builder can deliver non-leaking hydraulic systems. It's up to the user to keep them that way. We've found that most leaks result from poor maintenance.

Long hydraulic lines cause hammering. They should be avoided. All lines should also be protected so they can't be struck by materials-handling equipment or stumbled over by maintenance men.

The use of manifolding reduces the chance of valve damage in making a piping installation.

Maintenance—What can the user do to increase his machine tool's reliability? Here are some factors that influence the reliability of the equipment in the user's plant.

Always keep electrical-panel doors closed. This prevents dirt from gumming up the contacts.

Remember, filter elements are important. Many elements are redlined to pinpoint replacement needs. If not, you should follow a fixed maintenance schedule.

A high-quality hydraulic fluid is a must. It should contain additives which inhibit rusting and lacquer formation. Naturally, it must insure good lubrication with an adequate viscosity index.

Don't Guess—If you replace any component, pay strict attention to reassembly details. Poor connections can and should be avoided. Your maintenance men should understand all of the functions of the various components before they attempt to make any repairs.

Whenever hydraulic fluid is added to the system, dirt is a potential troublemaker. The filling methods employed must be ultraclean.

Of course, no matter how good your preventive methods may be, problems can arise even with the best equipment. When trouble is encountered, call in a serviceman from the builder. Avoid experimental repair procedures until the system is fully understood or wait 'til the serviceman arrives.

Joint Efforts—If the user wants peak reliability from a special machine tool, this should be a paramount issue at the quotation stage. All quotes should be analyzed to make sure reliable components and designs have been specified.

The hydraulic system must be carefully studied. It's normally the first suspect when a machine tool is down. A poor component choice or a small design flaw can create excessive downtime. Poor maintenance also comes in for its share of the blame.

The concept of machine tool reliability managers, now being instigated by some automakers, is a commendable one. Every machinery builder is vitally concerned with his product's reliability. Too often reliability data aren't relayed to a builder except by hearsay.

Why not bring in the reliability manager at the quotation stage? He can make certain that all former sources of reliability problems have been considered in the design of the equipment under study.

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Pinpoint Facts on Machine Time

Control Unit Records Shop Activity Automatically

What's the holdup? How many machines are down? Will the schedule be affected? These questions are often asked.

A Readout - Telecontrol unit posts the answers automatically.

▪ Factories consist of men, machines, materials and supporting services. A new control now harnesses modern data processing methods to the more efficient use of each of these four production ingredients.

Readout - Telecontrol, developed by Hancock Telecontrol Corp., New York, gets the foreman to a trouble spot quickly. The readout system records the downtime on control cards.

Covers the Plant — The system consists of a complex of control panels. A switching cabinet connects the sensor from any machine tool to any control panel. A monitor cabinet records up to 40 key operations with an inkless strip chart.

Each control cabinet has 15 control panels. These panels are of two different types—master control and group control. The master monitors the operations of one or a group of machines.

The master control panels are set up with semi-fixed data such as operator, part number, operation master and pay code. In turn, the unit displays and records productive time, downtime, units produced and uncompleted balance of run.

Controls the Group—Group control panels permit plugging of individual operator and pay-rate information for up to six operators per shift. Each control panel includes a rotary switch. The switch allows any machine in the plant to be automatically assigned to any of three preset schedules.

The three programs control periods when the machine will operate. The unit is able to establish starting time, rest periods, lunch period and shift changes.

Big Step—Charles J. Lawson, Jr., Hancock's president, calls the development a long stride toward automating factory control. Telecontrol gives management a complete, accurate and continuous picture of shop production.

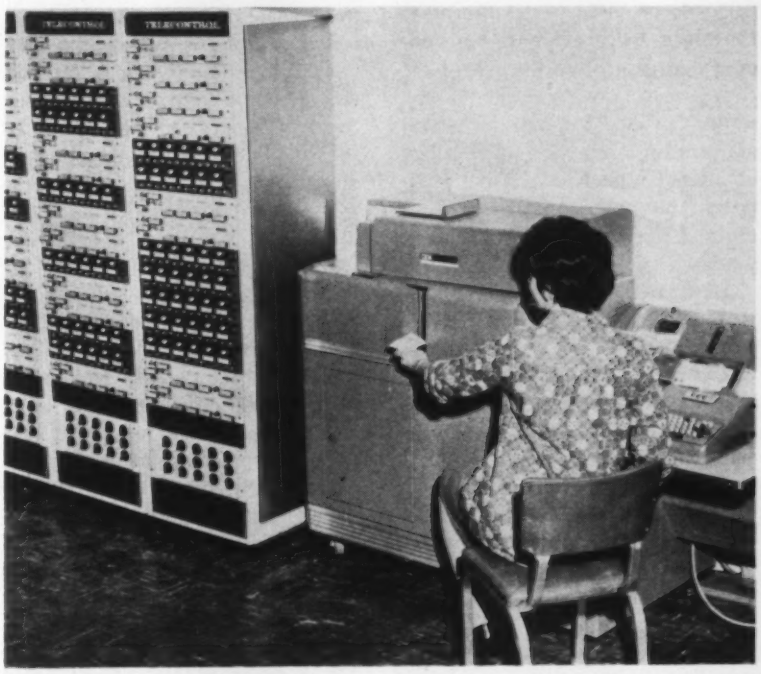
Tied in with this equipment is a communications system which enables a machine operator to summon assistance instantly if his machine requires adjustment. Break downs, lack of material or the need for a new die gets quick attention when it stands out on the control panel.

The Readout-Telecontrol unit enables management to correct or eliminate stoppages faster than ever before. Also, the unit helps anticipate and head off production snags, and overruns.

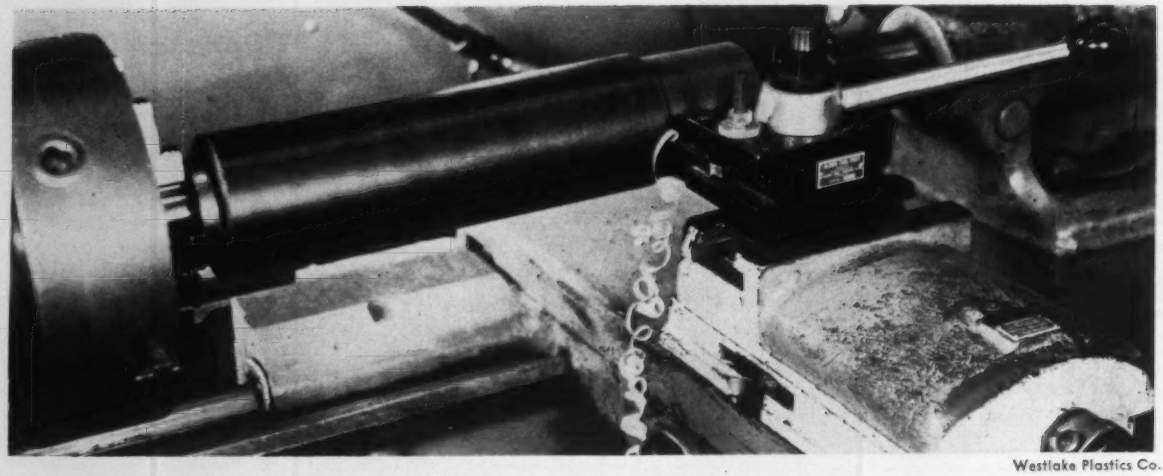
How It Works—A punch press operator strikes trouble. He throws a switch on his machine, alerting the control room supervisor by light and buzzer. The foreman is then summoned by a public address system.

When the foreman reaches the press, he either applies a quick fix or asks the control room for a repairman, die-setter or stock chaser. This is done with a plug-in telephone which he carries at all times.

In the meantime, the operator is reassigned to another job if the punch press is out of action for a lengthy period. Meanwhile, Telecontrol records the downtime.



TAKING NOTES: The status of more than 100 machine tools are mirrored into the control room. Data are transcribed instantly onto punched cards.



Westlake Plastics Co.

LATHE TURNING: No coolant is needed at slow speeds. Higher speeds require a non-water soluble coolant.

Plastic Wins Functional Jobs

Rugged Polycarbonate Gains Favor in Metalworking

Any plastic that can satisfy both functional and decorative requirements deserves attention.

Here's a very tough material that can be machined by conventional metalworking tools.

▪ Plastics made from polycarbonate resins are receiving a great deal of attention lately by design engineers. This material has many properties of particular interest to metalworking.

Here is a tough, strong plastic that can be machined by conventional metalworking tools. It has already been injection molded or machined into such products as ball bearings, nuts and bolts, couplings, pump impellers and air diffusers.

Polycarbonates are produced in an assortment of opaque, translucent and transparent colors. They can even be metallized. Other key properties include heat resistance, dimensional stability and low moisture absorption. In addition, you can mold these materials to very demanding tolerances.

Source of Supply—One of the major producers of the resin is General Electric Co., Pittsfield, Mass. GE markets the material under the trade name of Lexan.

Polycarbonates have been machined into ball bearings for turrets in tanks for the U. S. Army. Since the Army had already started to build races out of aluminum, a suitable plastic was needed for the balls. Thermosetting plastics failed on impact strength and thermal shock.

Most thermoplastics failed on two other counts: deformation and recovery. Lexan, however, offered greater impact strength and higher resistance to creep than any other thermoplastic examined.

As a companion material for the aluminum, polycarbonates offer no chance for Brinelling or corrosion. The Lexan balls weigh about 80 pct less than steel and present an attractive cost savings of 50 pct.

Jet Pumps—One of the early users of Lexan is Sta-Rite Products, Inc., Delevan, Wis. This company uses the plastic for impellers in jet pumps. Sta-Rite claims that the material increases the pump's efficiency. The reason for this is that the surfaces of the polycarbonate are so smooth that friction and drag are reduced to a minimum.

The nozzle and the venturi are also molded from the plastic. The impellers are injection molded in two pieces. They are then machined and finally cemented together with a solvent.

Lexan offers many advantages in the pump application. It does not soften, swell or change shape in water. It is non-corrosive, odorless and tasteless, non-toxic and isn't subject to electrolysis. When tested, the material also revealed an impact strength of 12-16 ft-lb per in. of notch on a ⅛-in. bar.

Lighter Weight — A builder of heating and air conditioning systems, Carnes Corp., Verona, Wis., is now using injection-molded polycarbonates for air diffusers. Unit weight of these parts has been reduced to 2½ oz.

Carnes officials point out that the material can be produced in an al-

most infinite variety of patterns to meet functional and aesthetic requirements. Also, once the plastic module comes out of the mold, no further finishing is needed.

Maintenance is just about eliminated. The integral white color of the new diffusers does not fade or yellow with age. The plastic will not bend or break if dropped. The dimensions remain intact.

Fewer Steps—The material can be produced in one shot where other materials might require lengthy, costly assembly. The original counter wheel for an elapsed-time indicator called for 28 secondary machining and assembly steps. With Lexan, it's simply a matter of removing the molding gate.

In dollars and cents, there's a cost reduction of 85 pct. Where 14 parts were needed in the old design, now just four plastic wheels will do the same job. These wheels are used by the A. W. Haydon Co., Waterbury, Conn., in its small motor-driven elapsed-time indicators.

Although injection molding is the most widely used method of producing polycarbonate parts, some companies are shaping Lexan with vacuum forming. This method is being put to work to build transition couplings in the radar program at General Electric Co., Syracuse.

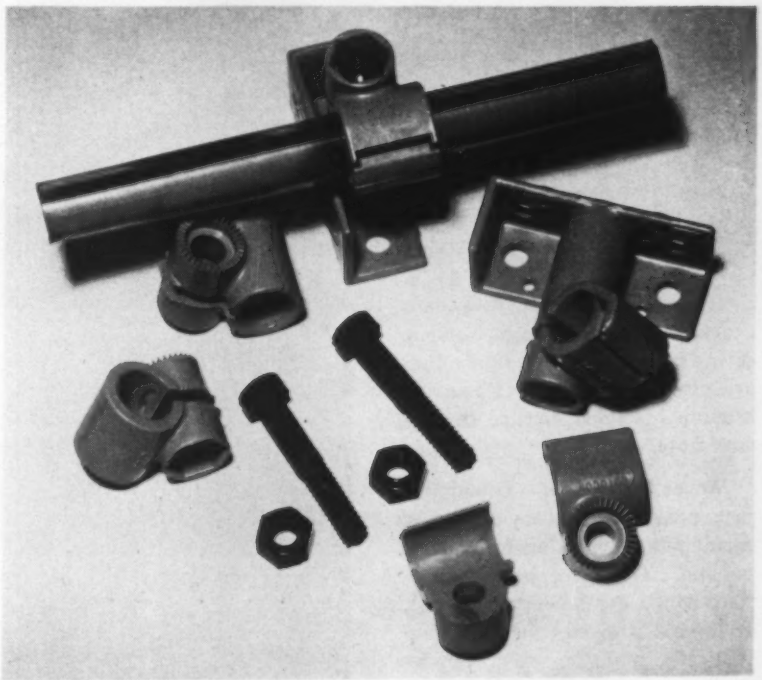
Cooling Function—They're in a blower which furnishes cooling air to hot spots throughout the delicate network. Vacuum forming was done to 40 mil gage on wooden dies. The properties in Lexan permit the material to exceed temperature requirements of —54°C to +54°C under various humidities.

Polycarbonates can also be painted with high-temperature bake finishes. This feature prompted Motorola, Inc., Franklin Park, Ill., to use the plastic in pushbuttons for car radios. The pushbuttons have a base and top coat, both of which are baked on at 265°F.

An interesting design feature of the plastic is its clear transparency. A housing built out of clear Lexan, for example, would keep operating parts in constant view.

Westlake Plastics Co.

EASY TO SAW: Lexan parts can be sawed with any type of saw. Here, an excellent finish is provided by a band saw without coolant.



Unistrut Products Co.

NUTS AND BOLTS: Polycarbonate resin has been molded into such shapes as assemblers and fastening nuts and bolts for many applications.

Tap Blast Furnaces Automatically

Modern blast furnaces call for high operating pressures and a hard plug material. This makes tapping quite a difficult chore.

Here's an automatic tapper that hits the same spot every time, quickly and safely.

■ A new remote-controlled tapping jack, put into service on a blast furnace at a major steel plant, cuts tapping time to a minute or less. The drill automatically hits the same spot in the plug time and again. Thus, the unit is regarded as an important adjunct in raising steel production.

The traditional furnace tapping method is often slow and difficult. Using a hand-operated pneumatic drill to pierce the clay plug, it takes two to four men to cut the 3-in. diam, 6-ft long hole.

When the drill hits the metal skull it must be withdrawn to protect the operator. The hole is blown clear with compressed air and an oxygen lance then burns through the skull. At best, the job takes 15 minutes.

One Man Job—The new tapping jack developed by Ingersoll-Rand Co., New York, is a heavy-duty percussion drill. Mounted on a hydraulically-operated boom, the unit is controlled by one man, some 30-ft away.

The drill is powered and positioned by over-sized air motors. The rig is completely pneumatic and hydraulic with no electrical elements of any kind. Air and hydraulic lines are made of rigid steel piping and asbestos - shielded, flexible stainless steel hose.

Moves Into Action—The tapping jack pivots on a heavy steel base plate bolted to a furnace support column. The main boom can be fixed at any length between 8 and 12 ft so that it swings the drill automatically into the exact position desired.

A 5-in. ID hydraulic lift cylinder and a universal joint secure the drill to the main boom. Thus, the drill moves in at precisely the same angle every time.

Levers on the remote-control console lower the drill into working position and regulate its speed

In a single stroke, the drill cuts through clay and skull, then retracks quickly as the hot metal starts to flow. Throughout the drilling operation, compressed air clears the hole and cools the bit.

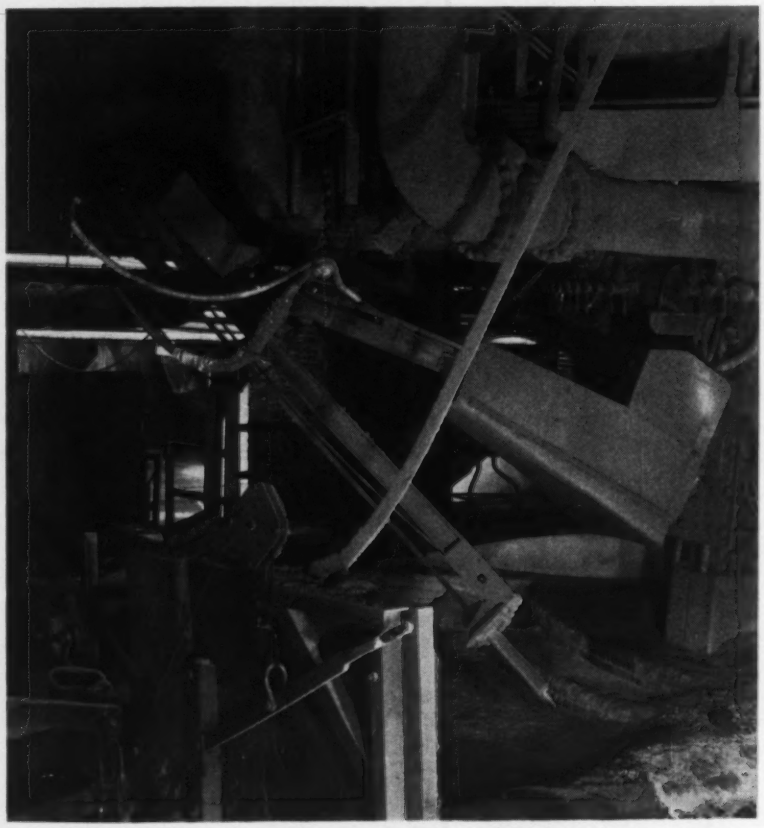
Tough Pace—Experience at the plant confirms the advantages of the automatic drill. The furnace operates on a 4-hour cycle with six taps a day.

According to operating personnel, the drill hits the same spot in the plug every time. Actually, once the jack is adjusted, only accidental warping of the heavy jack rod could interfere with tapping accuracy.

Tapping accuracy preserves the plug and makes it possible, after each tap, to swing the clay gun into the hole without taking the air off the furnace. A constant hole size also results in less erosion and better flow control.

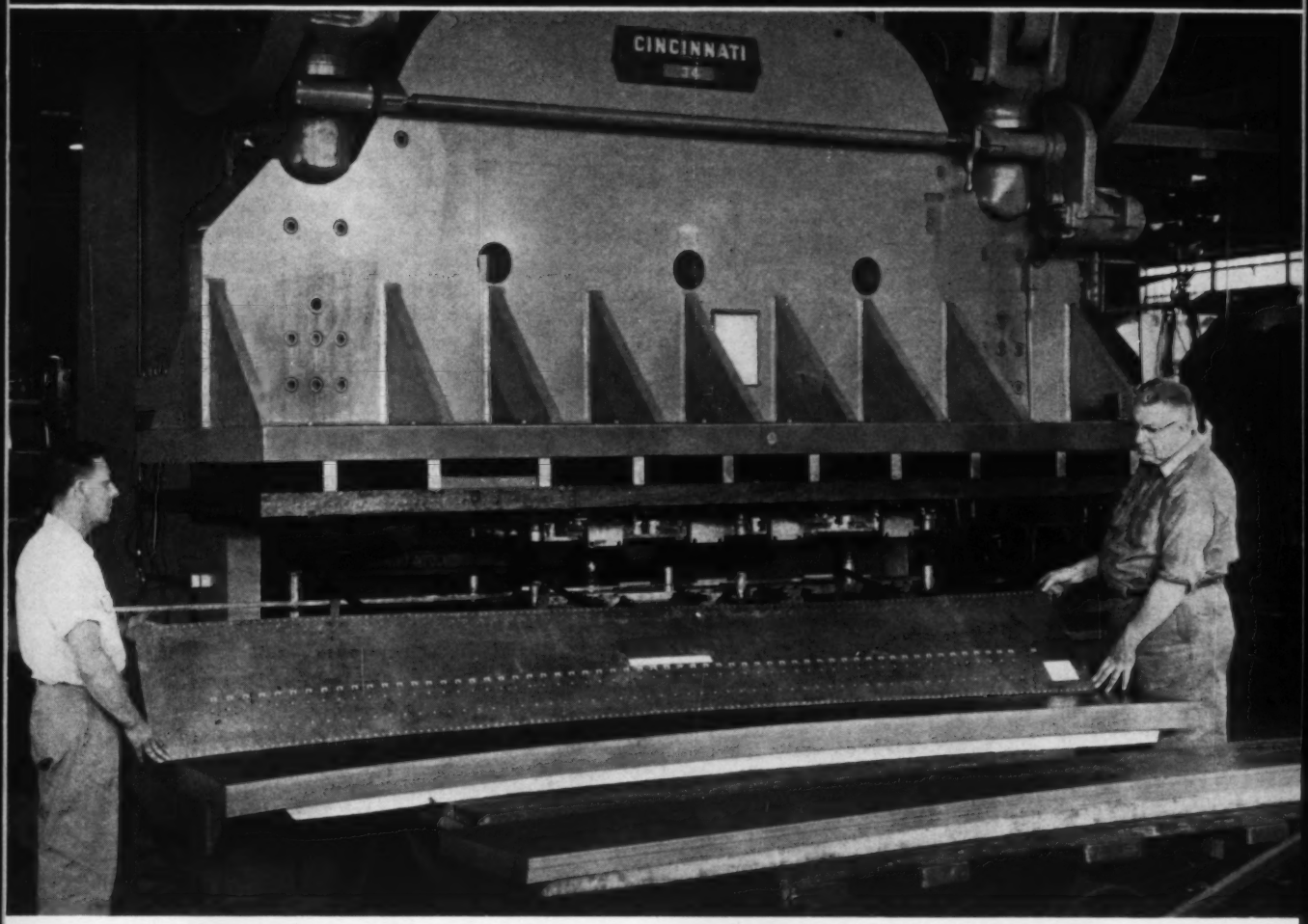
Operating executives would be satisfied with a drilling time of 2 minutes (compared with the previous 15-minute average). However, men at the furnace report that average drilling time with the new rig runs only 30 to 60 seconds.

The operator of the tapping jack is in a protected position 30 ft from the plug when the drill goes through the skull. Thus, there is an added measure of safety to match work efficiency.



ONE QUICK STROKE: The percussion drill pierces plug and skull, then swings away from the flowing metal. Time needed?—30-60 seconds.

CINCINNATI® PRESS BRAKE
cuts press work costs



Courtesy Dahlstrom Manufacturing Corporation, Jamestown, N. Y.

For half the initial cost of a conventional press with equal die area and tonnage, the Dahlstrom Manufacturing Corporation does its press work on a Cincinnati Press Brake with widened bed and ram.

Its low first cost has been followed by other savings, too. For example, setup and operation are easy and fast because the die area is out in front of the housings. Floor-to-floor time per piece is half what it was with previous production methods. Cincinnati accuracy holds .005" tolerances between holes.

Dahlstrom uses the full versatility of the Cincinnati Press Brake for shallow draw work, blanking, notching, and punching. Ask our representative to show you how to earn similar savings in your shop.

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Diameter	5mm. (13/64″)—16mm. (5/8″)
Weight	Single Bundle about 270 kgs.—320 kgs. 600 lbs.—700 lbs. Compressed Bundle (6 coils) about 1,620 kgs.—1,920 kgs. 3,600 lbs.—4,200 lbs.
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NEW PATENTS

Bronze-Iron Alloys

Bronze alloys containing iron, C. H. Hannon (assigned to General Electric Co.), Sept. 19, 1961. A bronze alloy with excellent workability and high resistance to chemical and stress corrosion consists preferably of about 7.3 pct Al, 1.9 pct Si. 3.6 pct Fe, and the balance essentially all Cu. U. S. 3,000,733.

Aluminum Coating

Hot-dip aluminum coating, J. E. Logan (assigned to The Wean Engineering Co., Inc.), Sept. 19, 1961. In the hot-dip aluminum coating of steel wire, steel strip, and the like, the wire or strip is first fluxed with a phosphorus or phosphorus-sulfur compound and then immersed in the molten aluminum. The resulting coating adheres tightly. U. S. 3,000,756.

Malleable Cast Iron

Malleable white cast-iron alloy, A. Wittmoser (assigned to Firma Eisenwerke Gelsenkirchen A. G., Gelsenkirchen, Germany), Sept. 19, 1961. Patent covers the production of a white cast-iron alloy in which the carbon is in the form of nodular graphite. Also, this alloy is substantially free of cementite. In the production process, the raw alloy is nodulized at 900-1000°C and then cooled. U. S. 3,000,770.

Rimmed Steels

Method for producing non-aging rimmed steels, E. R. Saunders, R. M. Franks and C. A. Beiser (assigned to Union Carbide Corp.), Sept. 12, 1961. In the production of non-aging rimmed steel, the molten bath is treated with an addition agent containing at least 25 pct manganese and an amount of columbium, tantalum, vanadium or boron sufficient to combine with the steel's nitrogen. U. S. 2,999,749.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

For Remote Control

Termed essential for any engineer contemplating the use of remote control for valves, a new 20-page design manual covers a complete line of manual-remote controls. Dimensional sketches of all terminals represent a real boon to the designer. (Stow Mfg. Co.)

For free copy circle No. 1 on postcard

Synthetic Lubricants

Characteristics and advantages of the Ambiflo line of synthetic fluids and lubricants are described in new technical literature. These versatile products are used as brake fluids; as tire, textile or metalworking lubricants; and as heat transfer agents. (The Dow Chemical Co.)

For free copy circle No. 2 on postcard

Multifuel Engines

The complete story of the development of 12 multifuel engines is told in a colorful new brochure. These engines can use any fuel from diesel-2 to combat gasoline. Models range from 20-650 hp. (Diesel Engine Div., General Motors Corp.)

For free copy circle No. 3 on postcard

Universal Joints

Six pages of information on a new line of universal joints highlights the current issue of "Production Road," Twin Disc Clutch Co.'s quarterly magazine.

For free copy circle No. 4 on postcard

Soluble Cutting Oils

This bulletin serves as a guide to soluble-oil selection. It also lists dilution rates for specific machining operations on steels, irons, alloys, aluminum, copper and copper metals. (Shell Oil Co.)

For free copy circle No. 5 on postcard

Prices of Stainless

Designed for quick, easy and accurate reference, a new 24-page stainless-steel price list sets forth new prices effective Sept. 1. According to the manufacturer, the new list represents an overall downward trend, although in isolated cases, prices are higher. (Ulbrich Stainless Steels, Inc.)

For free copy circle No. 6 on postcard

Cutter Sharpening

Here's a new 24-page catalog which covers attachments and accessories for cutter sharpening. Featured are an improved cutter-grinding fixture and an air-cushioned spindle bearing. Also described and illustrated are many methods for sharpening cutting tools. (Rocheleau Tool & Die Co.)

For free copy circle No. 7 on postcard

Sheet-Steel Separators

Top efficiency for every gage, sheet size and stock-pile height is claimed for a complete line of permanent magnetic separators in an attractive brochure. The literature points out the physical laws involved in the magnetic separation of steel sheets. It also presents detailed specs on a wide range of models. (Magni-Power Co.)

For free copy circle No. 8 on postcard

Stainless-Strip Data

A comprehensive, strikingly-illustrated brochure provides a guide to the selection of various stainless grades for specific uses. Data on the chemical, physical and mechanical properties of 19 stainless types are provided. There's also information on heat

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FREE LITERATURE

treating and finishing. (Superior Steel Div., Copperweld Steel Co.)
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Space-Age Ceramics

Newly-published is an attractive catalog on high-temperature ceramics. It contains complete detailed information on ceramic compositions such as Alumina, Magnesia, Thoria, Zirconia and others. The catalog also lists sizes and prices for crucibles and tubing that are available from stock. (Laboratory Equipment Corp.)
For free copy circle No. 10 on postcard

Boring Bars

Micro - adjustable boring bars with throw-away inserts are introduced in a new seven-page catalog. It suggests that "throw-aways" permit "free" design without regard for the maintenance-grinding restrictions of conventional tooling. (Vascoloy-Ramet Corp.)
For free copy circle No. 11 on postcard

Ball Bearing Catalog

Forty-eight pages cover a broad range of information on a line of miniature and instrument ball bearings in an attractive new catalog. Also, various testing functions are pictured and described; as are those concerned with an emphasis on reliability. (New Departure Div., General Motors Corp.)
For free copy circle No. 12 on postcard

Steel Castings

Commemorating 50 years of commercial steel casting production by the Electric Furnace Process, an attractive brochure discusses the services and castings available from the Treadwell Engineering Co.
For free copy circle No. 13 on postcard

Center of Gravity

Four, two-color pages in a new brochure furnish all the details on three new weight and center-of-gravity locators for the missile and space industry. Features, applications and operating theory are all included. (Dynametrics Corp.)
For free copy circle No. 14 on postcard

Stud Tightener

In-use action photos illustrate the Diamond Stud Tensioner in a new six-page booklet. According to the manufacturer, this device provides an improved method of tightening flanged joints on pressure vessels. (Diamond Power Specialty Corp.)
For free copy circle No. 15 on postcard

Theory of Lubrication

The theory and use of solid lubricants is thoroughly discussed in a new eight-page, four-color brochure entitled "Breaking Lubrication Barriers." (The Alpha-Molykote Corp.)
For free copy circle No. 16 on postcard

Solenoid Brakes

With ratings, wheel data and dimensions, a new four-page brochure gives all the details on a line of ac solenoid-operated brakes. It also lists construction features which provide long mechanical life. (Cutler-Hammer Inc.)
For free copy circle No. 17 on postcard

Avoid Casting Snags

In a new four-page brochure, 12 of the most-common problems encountered in casting iron and steel are listed in easy-to-read tabular form, along with the commercially-available products that solve them. (Foseco, Inc.)
For free copy circle No 18 on postcard

Refractory Abrasion

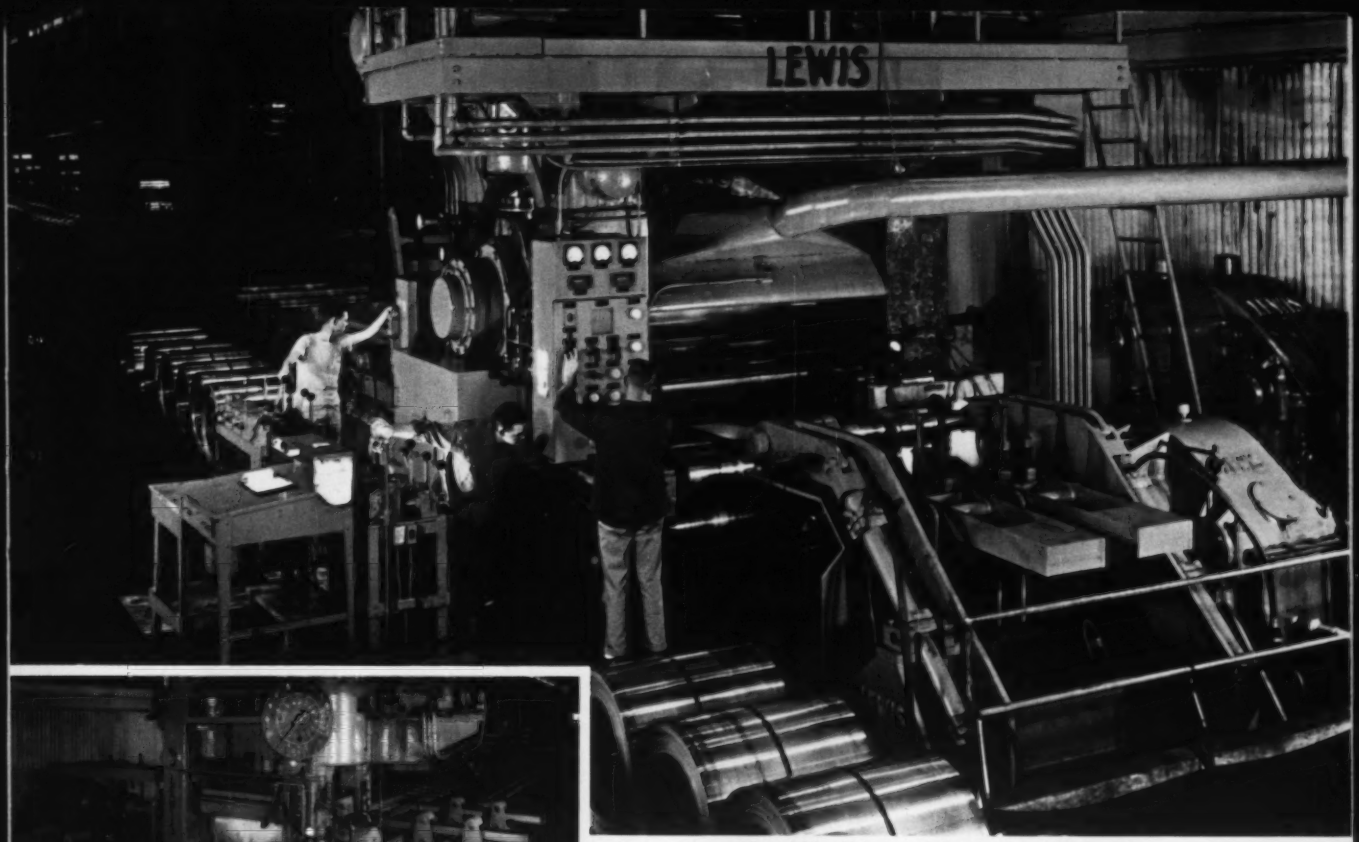
An eight-page reprint describes the results of an abrasion test for refractory brick and monoliths. Complete details as to techniques, equipment and results are described with text, photos, tabulations and charts. (Harbison-Walker Refractories Co.)
For free copy circle No. 19 on postcard

Tracer Mills

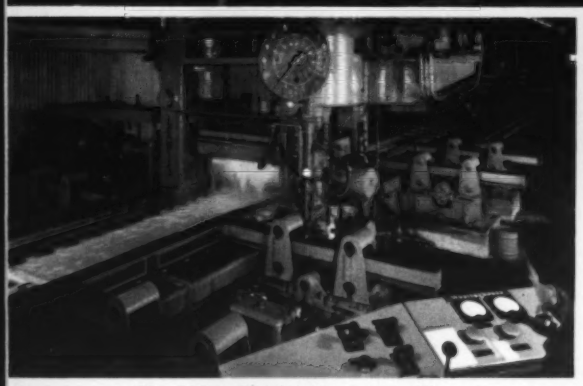
This highly-educational, 6-page catalog furnishes an insight into the many job functions performed on electro-hydraulic tracer mills. Systems and operations are graphically illustrated. (Famco Machine Co.)
For free copy circle No. 20 on postcard

Lift-Truck Engines

"Power-Crater" engines, used to power an advanced line of lift trucks, are described in a new eight-page, two-color catalog. Engine pictures and power curves for all models supplement the text. (Allis-Chalmers Mfg. Co.)
For free copy circle No. 21 on postcard



15 and 36 x 69-inch 4 high reduction mill.



30 x 70-inch 2 high hot reversing mill.

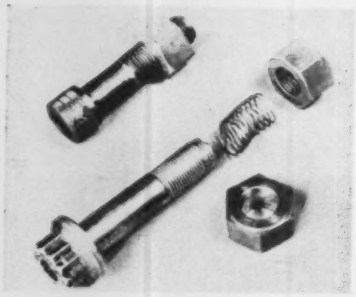
BLAW-KNOX ALUMINUM REDUCTION MILLS

Blaw-Knox designs and builds a full range of mills for the reduction of aluminum and other non-ferrous metals. Other Blaw-Knox equipment for the metals industry includes: Complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals: • Sheet and strip processing equipment • Electrolytic tinning, annealing and galvanizing lines • Seamless pipe and tube mills • Draw benches, and cold draw equipment • Blaw-Knox Medart cold finishing equipment • Iron, alloy iron and steel rolls • Carbon and alloy steel castings • Fabricated steel plate or cast-weld design weldments • Steel plant equipment • Heat and corrosion resisting alloy castings. Blaw-Knox Company, Foundry and Mill Machinery Division, Blaw-Knox Building, Pittsburgh 22, Penna.

BLAW-KNOX

Blaw-Knox designs and manufactures for America's growth industries: METALS: Rolling Mills • Steel Processing Lines • Rolls • Castings • Open Hearth Specialties • PROCESSING: Process Design, Engineering and Plant Construction Services • Process Equipment and Pressure Piping • CONSTRUCTION: Concrete and Bituminous Paving Machines • Concrete Batching Plants and Forms • Gratings • AEROSPACE: Fixed and Steerable Antennas • Radio Telescopes • Towers and Special Structures • POWER: Power Plant Specialties and Valves

New Materials and Components



Beryllium Copper Makes "Tough Nut to Crack"

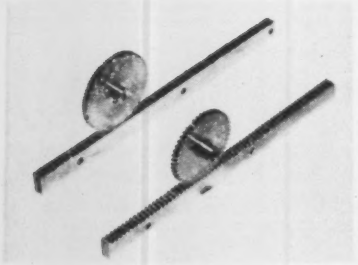
Development work on the use of beryllium copper for heavy, semi-finished hex-machined nuts indicates that this material is ideally suited for applications where the load factors exceed the limits of present materials. Some striking test results from Beryllium Corp. back up this contention. For example, with ⅝-in. beryllium-copper hex nuts, maximum stripping load occurs at 65,000-75,000 lb, using bolts made of "Vasco-Jet" alloy. There should be a bright future for these "tough-to-crack" nuts wherever high strength, corrosion resistance and good conductivity are vital.

For more data circle No. 25 on postcard, p. 99

Pure Cobalt Strip Features Good Ductility

According to the manufacturer, pure cobalt coiled strip with good ductility is now commercially available for the first time. The strip comes in thicknesses ranging from 0.005-0.025 in., and in widths of ¼-6 in. Up till now, pure cobalt metal in strip form has not been commercially available because it was said to lack the ductility and workability essential in metalworking operations. Its important electrical and mechanical properties and corrosion resistance were chiefly used in alloying. However, this new strip preserves these properties and extends cobalt's metalworking uses to a much wider range of products. Key to the strip's improved properties lies in the purity of the powder from which it's rolled; and in a new powder-rolling process. (Sherritt Gordan Mines Ltd.)

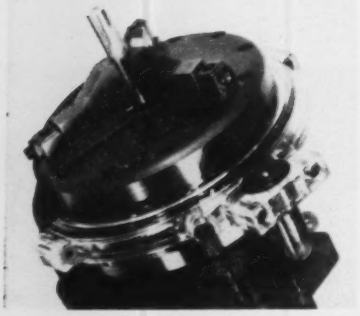
For more data circle No. 26 on postcard, p. 99



Precision Spur-Gear Racks Are Stress-Relieved

To meet the increased demand for high-precision racks, these "certified" spur-gear racks are manufactured from 416 stainless steel under controlled stress-relieving procedures before final cutting. Rack dimensions are certified at final inspection and a complete inspection report is supplied with every rack. Shelf-life or temperature variations have very little distorting effect on the new racks. They're available in three precision classifications with a wide range of pitch sizes. (PIC Design Corp.)

For more data circle No. 27 on postcard, p. 99



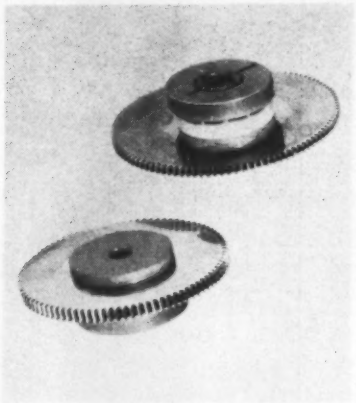
Air Coupling for Chucks Suits High-Speed Work

Here's a new air coupling with self-contained air cylinders, for the designer of chucking equipment. Inserting air through the cylinder walls actuates the chuck. This unusual design lets you keep the center of the chuck open for through feeding of bar stock. To operate the unit, the air is turned on after the work spindle has stopped. When the chuck is loaded with air, the work spindle can be started again and run at any desired speed. Also, when the chuck is running, there's no friction. This is so because clearance is established when the coupling is set up to run. It's an ideal condition for high-speed jobs. (The N. A. Woodworth Co.)

For more data circle No. 28 on postcard, p. 99

Gear-Type Slip Clutch

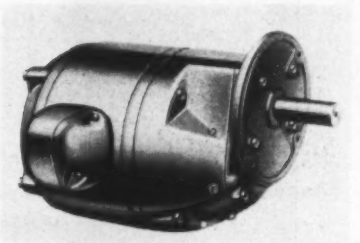
An improved gear-type slip clutch, adjustable from 0-50 in. oz torque, is precision engineered to MIL-E-5272 C. The assembly is comprised of a stainless-steel spur gear, Delrin bearing and clutch plate, steel spring, anodized-aluminum hub and clamp. The Delrin bearing and clutch plate are designed to achieve smooth torque transmission with a minimum change from the preset torque value. The axial position of the clamp sets the torque and locks the unit to its shaft. (Northfield Precision Instrument Corp.)



For more data circle No. 29 on postcard, p. 99

Synchronized Gears

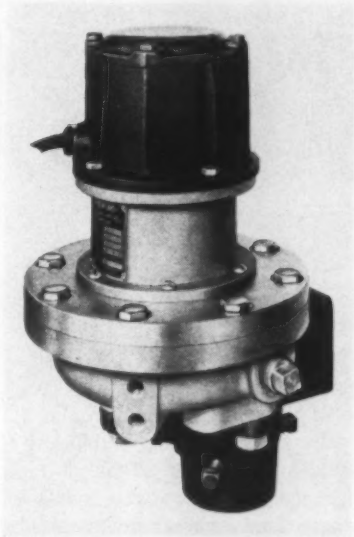
Designed for direct connection to the driven machine, a new footless single-reduction gearmotor has been added to an established line of these items. It's available with NEMA style C or D brackets in 9- and 10⅞ in., face-plate diameters, respectively. The newcomer retains the same quality features of the foot-mounted type. Examples are: asbestos-protected windings, normalized castings, precision-honed gears and solid-shank high-speed pinions. All gears and pinions are crowned during the shaving and honing operation to assure the best-possible surface durability and smooth, quiet operation. Only the slower-speed gears dip into the oil reservoir, providing efficient lubrication without churning. (U. S. Electrical Motors Inc.)



For more data circle No. 30 on postcard, p. 99

Measures Mass Flow

Here's an instrument which provides continuous precise measurement of gas density in lb per cu ft. Particularly valuable to the gas and chemical industries, this gas-density cell produces a differential pressure directly proportional to density. This measurement, combined with a pressure differential across a primary device, makes it possible to determine the mass flow of gas. In operation, gas at line-static pressure is introduced into the sampling chamber. Pressure is measured at a high-pressure differential connection. Rotating in the chamber is a hollow spinner, driven at a constant 3600 rpm by a synchronized motor. A magnetic coupling between the motor shaft and the spinner shaft, separated by a nonmagnetic seal cap, makes the chamber leakproof. Centrifugal force, produced in the spinner tube, creates a suction which draws gas through the tube from an opening at the center of the spinner. This suction pressure, varying directly with the gas density, is con-



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Better alloys often cost no more than the "inexpensive" ones when your part is an investment casting. What counts is *castability*, not machinability.

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SCREWS—Complete range of machine and self tapping with slotted or Phillips recessed heads, both magnetic and non-magnetic.

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PINS—dowel, taper, etc. Plus washers, rivets, threaded rod, studs, nails, many more.

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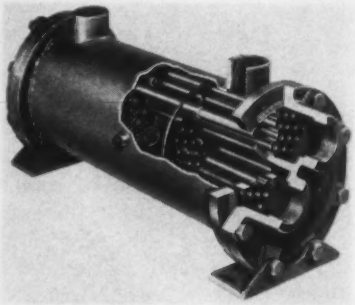
West Coast Division — Office and Warehouse
5822 West Washington Blvd., Culver City, Calif.
Phone: WEbster 3-9595 TWX LA 1472

nected from the hub of the spinner to the low-pressure differential connection. The differential between the high and low pressure is a true index of the gas density. (The Foxboro Co.)

For more data circle No. 31 on postcard, p. 99

For Swapping Heat

Designated as type 500, these compact heat exchangers are available with shell diameters from 3¼-8¼ in. Lengths range from 1 ft-4¾ in. through 6 ft-7 in. Use of ferrous materials for shells, connections and bonnets forms an exceptionally-strong and durable structure that withstands pressure surges and the corrosive action of synthetic oils and hydraulic fluids. Elimination of hubs overcomes leakage

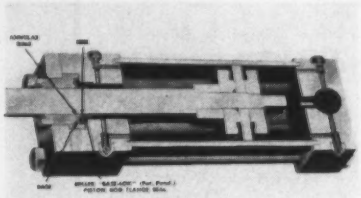


problems resulting from casting porosity and improper soldering or brazing. These new units meet heating and cooling requirements in the engine, compressors, turbine, hydraulic - equipment, machine - tool, light-marine, and process industries where fluid temperatures must be closely controlled with a compact, ruggedly-built exchanger. (Basco, Inc.)

For more data circle No. 32 on postcard, p. 99

Seals for Flange Rods

A design innovation has improved a line of self-adjusting, tamper-proof, pressure-energized flange-rod seals for air and hydraulic cylinders. An annular step at the ID of the bushing acts as a key to lock the base and heel of the seal in proper relation to the rod. In fact the base of the seal is so securely locked into position that it becomes an effective bushing seal. This eliminates the need for a separate rod-bushing seal and pressure-balancing screen. On hydraulic cylinders (except water hydraulic cylinders), the rod-

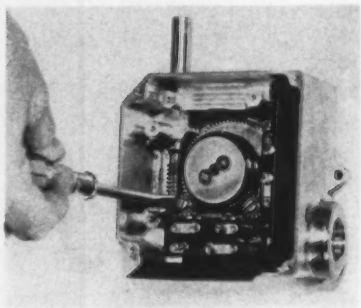


flange seal is Teflon to insure trouble-free service with all hydraulic fluids, including the special and fire-resistant types. On air cylinders and water hydraulic cylinders, the seal is synthetic rubber. (Miller Fluid Power Div., Flick-Reedy Corp.)

For more data circle No. 33 on postcard, p. 99

Switch Checks Rotation

A new rotating-shaft limit switch, designed to measure the revolutions of a drive shaft, can be used for stopping and starting overhead doors or hoists. It is also for use on machine tools where rotary motion, instead of linear motion, must be sensed. Cam adjustment of the limit switch may be performed with one hand. The switch is available in nine different gear ratios, from 20: 1 to 1280: 1. This provides



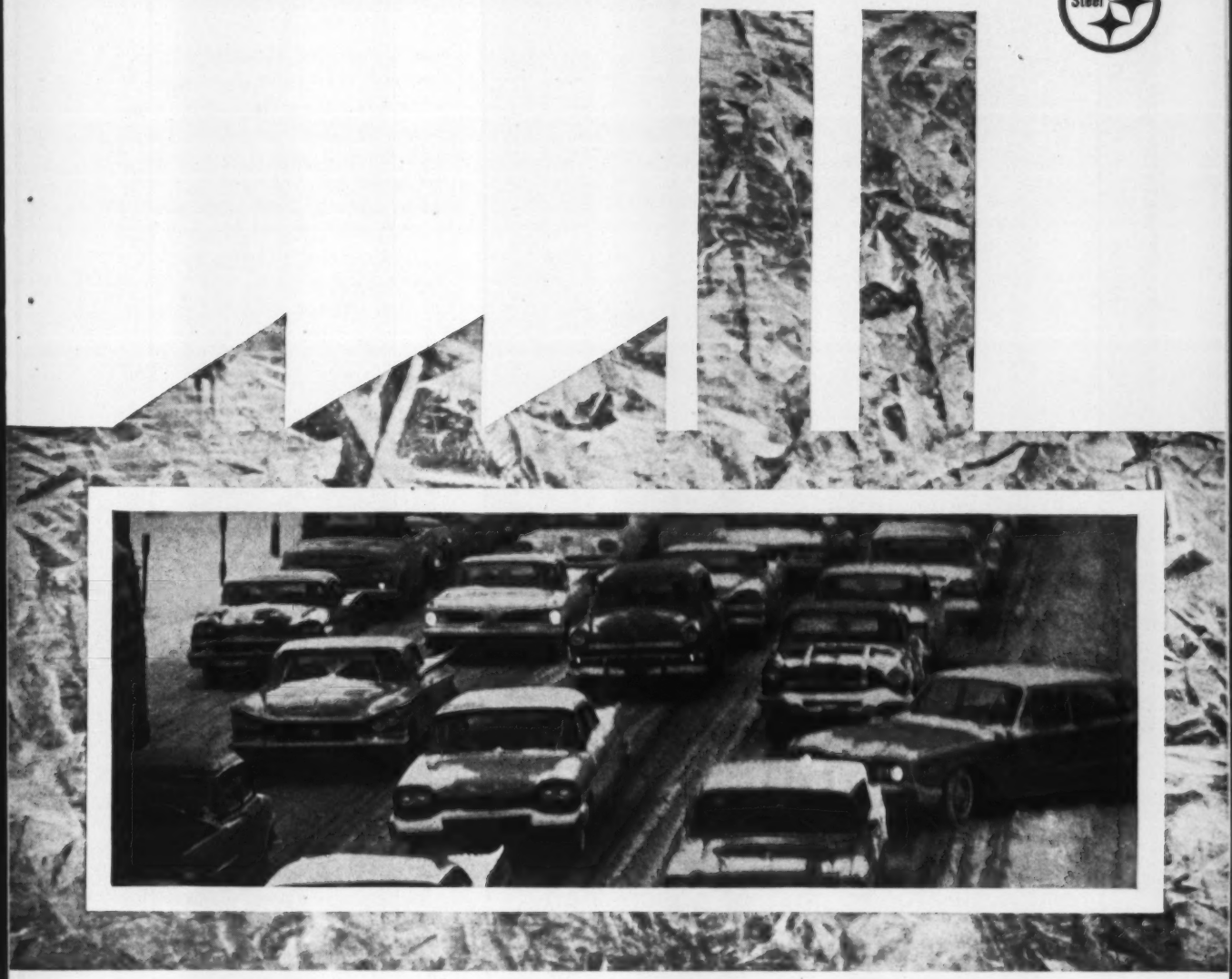
product flexibility and ease of adjustment. All gear ratios are provided with fast resetting action. (General Electric Co.)

For more data circle No. 34 on postcard, p. 99

Covers Ugly Flanges

Screwed, weld - neck or blind flanges can now be quickly covered with a new, preformed-aluminum flange cover. Completely removable

The new generation of U.S. autos fends off corrosion . . .



GUARDED BY GALVANIZED STEEL

Use of galvanized steel sheets in the automotive industry has increased by more than 700% since 1954—and more automotive applications are on the way.

As a result of this growing addition to Detroit's diet, both consumers and manufacturers are benefiting. To car owners, every pound of galvanized steel means more complete corrosion protection, added durability and savings in maintenance. To manufacturers, galvanized steel's simplified fabricating procedures bring reduced costs. Head and tail lamp housings, for instance, formerly required five or six steps when zinc plated or painted after stamping. Now they are moved direct from press to assembly line with their tight zinc coatings completely undamaged by fabrication. This also applies to side members, rocker panels, front and rear rails and cross members.

WEIRKOTE, IN PARTICULAR! One of the leading galvanized steels, Weirkote is widely used in the latest model automobiles. To the inherent strength, economy and versatility of steel, Weirkote adds enduring zinc protection via the modern continuous process. As a result, it can be worked to the very limits of the steel base without chipping or peeling. And it assures you long-lasting protection against corrosion. It is manufactured by two National Steel divisions, Weirton Steel Company and Midwest Steel Corporation. Write Weirton Steel Company, Weirton, West Virginia, for further Weirkote details.

MIDWEST STEEL
Portage, Indiana

WEIRTON STEEL
Weirton, West Virginia

divisions of
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NON-PRODUCTIVE FLOOR SPACE . . .

rent collector in cost of possession

Dust sifting softly down on idle steel stocks . . . the costly silence of inactive dollars "invested" in idle steel . . . the "rent" piling up for space that isn't producing anything.

Here's a solution . . .

Use the complete stocks of your nearby steel service center just as if they were your very own. Their convenience and availability are augmented by other economies, too. Plus many first-step processing services your center is tooled-up to provide.

Your production and cost accounting people may want to figure the *true cost* of steel stocks. Ask your steel service center salesman for the booklet, *What's Your Real Cost of Possession for Steel?* Or write to Steel Service Center Institute.

COST OF POSSESSION . . . *to determine your own cost of possession for steel in inventory, consider all these factors:*

Cost of capital: inventory, space, equipment — Cost of operation: space, material handling, cutting and burning, scrap and wastage — Other costs: obsolescence, insurance, taxes, accounting

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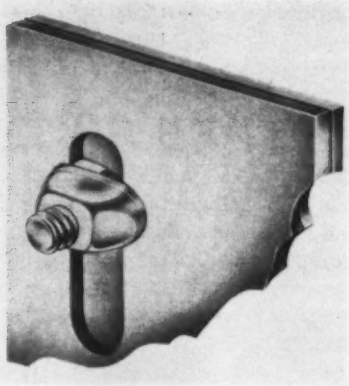
and replaceable, it comes with calcium-silicate insulation applied to the inside surface. All the user needs to specify is size, temperature range, pressure, and what type of flange is to be covered. The cover is completely prefabricated and shipped ready to be installed. A water-tight seal is provided by a two inch overlap that extends over the covering of the adjacent jacketing. Removable and replaceable in the field, covers can be removed to check for leaks, perform tests, or replace gaskets. To assure a perfect fit, the manufacturer does not sell the aluminum covers without the insulation for the cover. It may be specified in Foamglas, cork, polyurethane or calcium silicate. (Premetco)

For more data circle No. 35 on postcard, p. 99

Quick Release Fastener

Design simplicity and efficient performance at very-low cost are the highlights of a new quarter-turn, quick-release fastener. This one-piece molded-nylon fastener is a wedge—or keystone shape. The base has ramp-shaped corners for easy tightening and pull up. The quarter-turn engagement is halted by stops molded into the central base of the fastener. A hole, molded through the center of the fastener, is unthreaded. It has an ID smaller than either a coarse- or fine-threaded screw for a specific size. In a typical installation the screw is

inserted through the round hole in the cover plate and then threaded

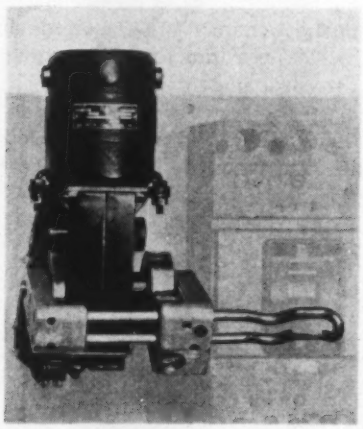


into the NY-Q fastener which may be held with a standard wrench or pliers. As the screw impresses itself with a perfect fit into the core of the fastener, it is gripped with a vibration-proof locking torque that substantially exceeds the forces of the lock-unlock action. (Elastic Stop Nut Corp. of America)

For more data circle No. 36 on postcard, p. 99

Drive-Motor Operator

This side-mounted, variable-friction, drive-motor operator is compactly designed so that it does not exceed the depth of the circuit breaker. The unit is recommended for remote-breaker operation of process controls, air conditioning, bus plug-in units, capacitor-bank



switching, engine generators and battery chargers. Its low profile, under 5-in. high, and side-mounting features suit the operator for use with existing breakers on panels, switchboards, and distribution centers. Also, units are available for

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Let your nearby steel service center carry your metal inventory . . . for delivery in the grade, dimensions, and quantity you need, *when* you need it, unloaded convenient to your facilities that will process it. Your steel service center can handle some first steps of pre-production processing, too . . . burning, sawing, bending, leveling. Service center salesmen are trained to give you expert counsel on grades and types, and cost-saving production short-cuts.

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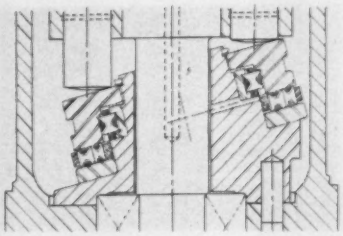
base-plate mounting to actuate all molded-case breakers from 100-1000 amp capacity. Control voltages are 120/240 v, and connection is made conveniently at a front-mounted, three-point terminal block. Mounting for either panel or base-plate application is a simple matter since the operator shaft is the centerline for mounting in relation to the centerline of the throw of the circuit-breaker handle. (Lake Shore Electric Corp.)

For more data circle No. 37 on postcard, p. 99

Dual-Purpose Bearing

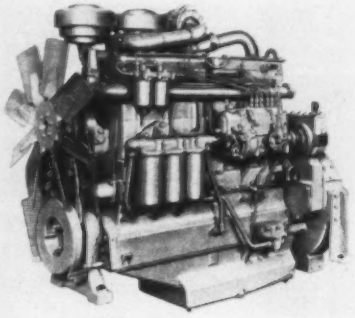
Operating continuously in a heavy-duty hydraulic-piston pump, at pressures up to 2000 psi and speeds to 2500 rpm, this double-purpose roller bearing carries a combination of radial and thrust loads. The load is imposed by a wobble action. This eccentric load is transmitted to the pistons which ride against the back side of the bearing race. Thrust plate OD is 4.953 in., and ID is 3.25 in. The combination, radial, outer race and thrust plate, that actuates the pistons, has an OD of 4⅞ in. and a 2½-in. bore. The inner radial race has an ID of 2.437 in. to fit the drive mechanism. Useful-thrust capacity equals 3350 lb at 1200 rpm. Radial capacity is 2370 lb at 1200 rpm. (Rollway Bearing Co.)



For more data circle No. 38 on postcard, p. 99

Multi-Purpose Diesels

All models in a new line of multi-purpose diesel engines operate at 1800 rpm; however units up to 100 hp are available in speeds up to 2200 rpm. The overall range will go from 37-670 hp. The newcomers are particularly well adapted for electric-power generation and for installations where long periods of uninterrupted running are required. Industrial plants, commercial businesses and hospitals are among the potential users. Only two basic bore and stroke sizes are used to provide maximum interchangeability of service parts. Key sizes are turbocharged to obtain a smooth progression of ratings over the entire range. (Fairbanks Morse & Co.)



For more data circle No. 39 on postcard, p. 99

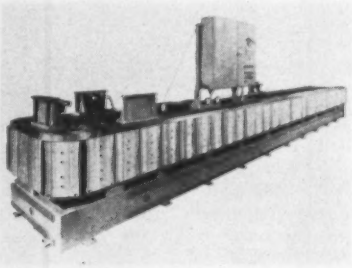
Carburized-Steel Rolls

For roll applications where wear resistance is a must, gas-carburized steel rolls offer several important advantages over iron units, according to a prominent roll manufacturer. Higher, more-uniform hardness is one big bonus. The company also states that carburized steel has a higher modulus of elasticity, better heat transfer, longer-wearing properties and finer finishes. Resistance to thermal shock, warpage, breaking and scaling further recommend the carburized-steel product. Available in both tubular and solid types, advanced facilities permit production of these rolls in sizes up to 48-in. diam x 24-in. length. (The Badall Co., Inc.)

For more data circle No. 40 on postcard, p. 99

Takes Special Tooling

A new heavy-duty, straight-line, indexing-machine chassis is built as a standardized unit ready to accept the customer's individual tooling. Designed and built to accommodate extra-large, extra-heavy work without sacrificing cycle time, the new unit is entirely self-contained. It includes provision for tool mounting and hydraulic-tool actuation. The chassis comes with drive motor, hydraulic pump and piping, and electrical wiring ready for tool application. (Swanson-Erie Corp.)



For more data circle No. 41 on postcard, p. 99

Bonded Brake Linings

Field trials of these bonded-industrial brake linings indicate they're suitable for heavy-duty steel mill and industrial uses.. The advanced linings will become standard equipment on a line of industrial brakes. Bonded linings offer several advantages over conventional riveted assemblies. For instance, there are no rivets to score brake drums as the lining wears. And bonded linings last longer be-

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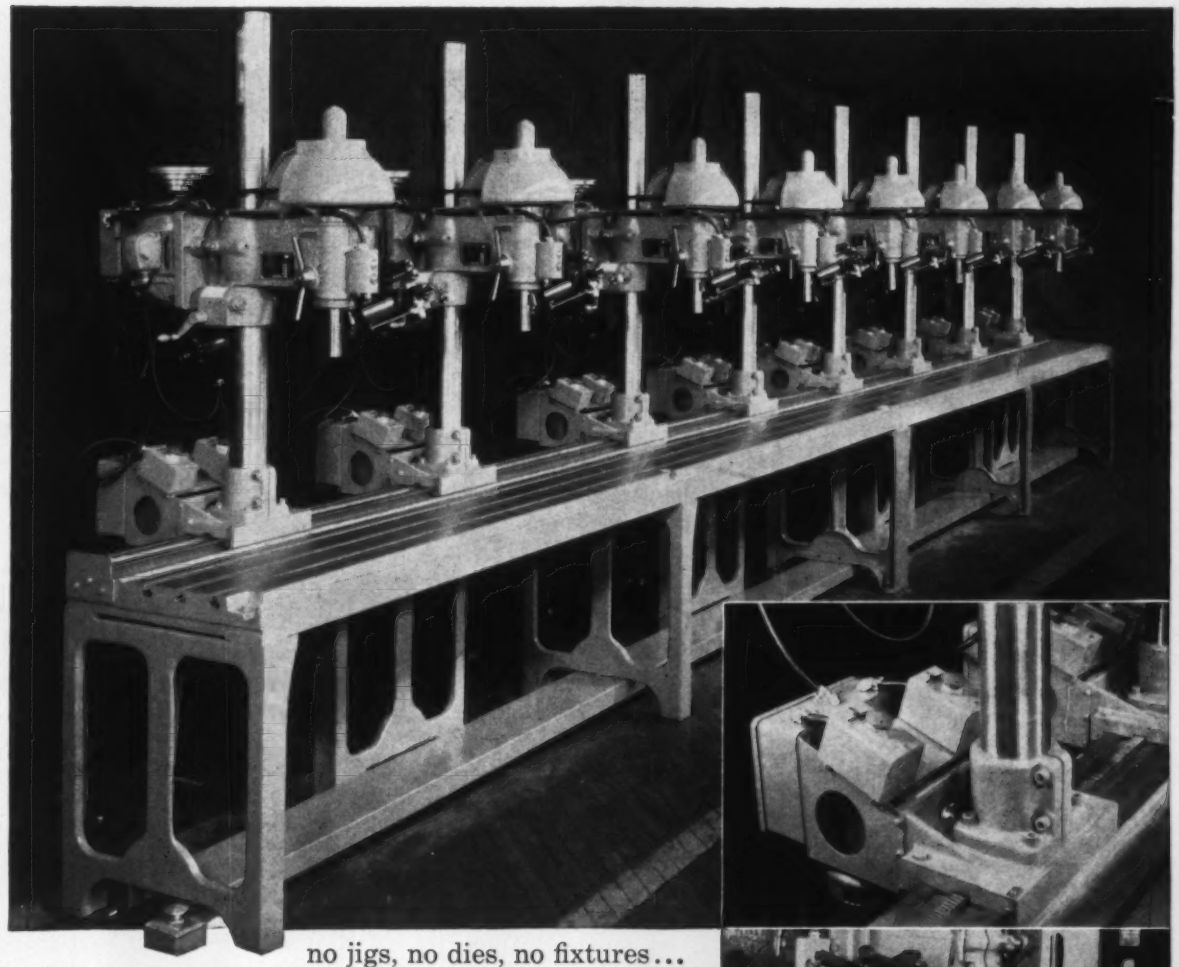
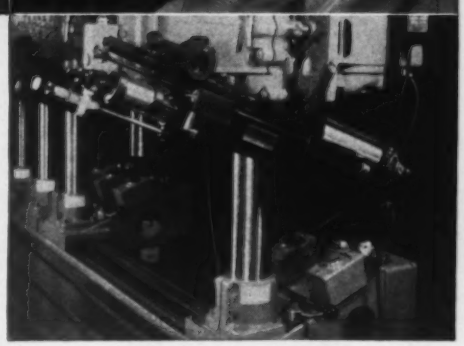




no jigs, no dies, no fixtures...

29 holes at the touch of a switch!

Production drilling engineered by 'Buffalo'

PROBLEM: Drilling as many as 8 sets of holes in straight sections of aluminum channels to be formed into door and window frames, with varying hole patterns at exact locations to fit hardware and cross members of different size frames.

SOLUTION: A specially engineered 8-spindle 'Buffalo' No. 18 Drilling Machine with air-operated spindles and gear motor-positioned spindles mounted on 28-ft. T-slotted and dovetailed table. Two jogging push buttons on each head move it left or right to nearest $\frac{1}{16}$" by stainless steel scale and indicators. Thus heads may be set up quickly for any pattern with holes as close as $12\frac{1}{4}$". A single foot switch actuates all spindles simultaneously, though any air feeds may be locked out.

CONCLUSION: For fast, accurate, flexible drilling, there's a 'Buffalo' machine quality-built for the job, or 'Buffalo' can engineer one to your exact specifications. Let us know your problem!

TOP: Spindle closeup showing motorized racking device, scale and indicator.

BOTTOM: Showing air-operated spindle feed, rack, slide and clamping device.

ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

MACHINE TOOL DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

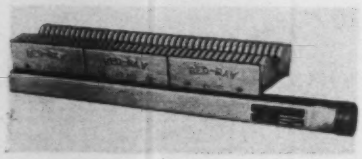
Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

cause they are effectively thicker. Also elimination of rivet holes results in a 10 pct boost in braking surface. As before, replacement of the new linings requires no disassembly of the brake or demounting of shoes. (General Electric Co.)

For more data circle No. 42 on postcard, p. 99

Infra-Red Burner

A new infra-red gas burner has just been announced. According to the manufacturer, laboratory and

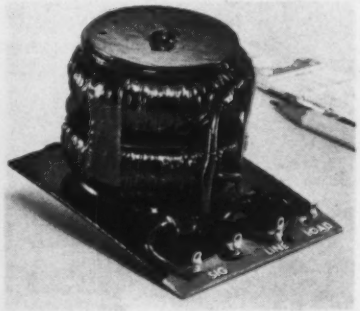


field installations have indicated a higher conversion ratio of fuel to infra-red than with any other commercially - available infra - red gas burner. Thus, great efficiency and effectiveness is possible using the new burners in drying and curing processes, heat-treating metals, and in dry-off and bake ovens. Designed to produce the major portion of its radiation in the far infra-red wavelengths above 2.7 microns, the burner comes in 2½-, 4½- and 7-in. lengths. Also, units can be mounted end-to-end on a common manifold, providing continuous heat radiators of from 2½ in.-100 ft or more. Width of the burner is 6⅝ in. The new burner is also available with profile adjustment of fuel input for each section. This lets you profile heat output across the full length of the burner and adjust for varying heat requirements across the width of the product being treated. (Red-Ray Mfg. Co., Inc.)

For more data circle No. 43 on postcard, p. 99

Static Switch

Rated at 40w, a new magnetic switch is ideally suited for applications on solenoids. The switch func-

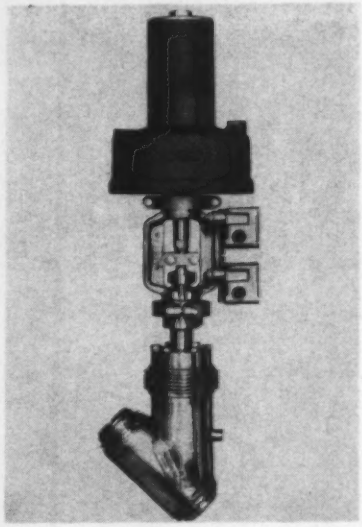


tions at a rate of 600 on-off cycles per minute. Required turn on time is one cycle, while turn off time is five cycles. There are only four terminals to be connected to the maintenance-free switch. It measures 2 x 2¾ x 4 in. (Magnetics Inc.)

For more data circle No. 44 on postcard, p. 99

Hydrogen Valve

Here's a new liquid hydrogen valve line, designed for missile propellant loading systems as well as other cryogenic applications. The unique design is comprised of Y-pattern valve body, and a two-positioner pneumatic actuator with a stainless-steel vacuum jacket. Globe and angle configurations are also available. These valves come in all ASA ratings. Sizes range from ½-10 in. An extremely large CV minimizes operational - pressure drop. Minimum heat gain and cool-down

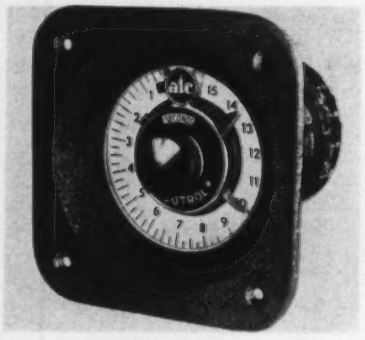


mass characteristics are provided by the vacuum jacketing. Leakage is completely eliminated by the seal welding. Also, very-tight shutoff, purge connection and adaptability to any actuator are standard engineering-design features. (Security Valve Co.)

For more data circle No. 45 on postcard, p. 99

Automatic Timers

This new automatic-reset dial timer is a synchronous motor-driven unit for control of ac or dc loads within variable-timed sequences or intervals. It features: 14-point terminal block for easy handling of up



to 7 individual load circuits; easy-to-read, removable, silk-screened dial which greatly facilitates range changes; solderless component connections for easy servicing in the field without soldering; and 16 dial ranges along with an optional quick-

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Combat Rising Costs?

LUCAS

"The advantages of numerical control, combined with the precision quality of the Lucas boring machine are currently reducing manufacturing costs at Sibley on . . .

- **Complicated missile hardware for a major prime contractor.**
- **Short-run lots of gray iron castings for equipment builders.**
- **Major components of the Sibley HT-40 tape controlled drilling machine.**

With this boring machine, only simple work-holding devices are required. Elimination of expensive jigs and fixtures makes the machine ideal for short-run manufacturing—lots of 10 pieces or up to 50 pieces per month have proven to be very economical . . . "

This quote was extracted from material prepared by the Sibley Machine & Foundry Company in South Bend, Indiana. It briefly sums up the story on their model 41 B 48 with Lucas Numra-Tronic Positioning Control to head, table, saddle and rotary table. Your Lucas representative will be happy to fill in the details, or write Lucas Machine Division, The New Britain Machine Co., 12302 Kirby Ave., Cleveland, Ohio.

LUCAS
PRECISION

Choice of Controls?

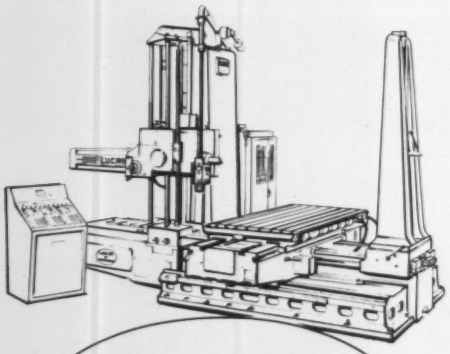
LUCAS

Lucas offers a complete selection of controls for every machine motion. You can select combinations of pendant and lever control, full pendant control and partial or full numerical control.

The Multiple Control Pendant selects speeds, feeds, unit travels, rapid traverse of head, table, saddle and spindle, plus spindle rotation forward and reverse, jog and stop. Preselection of speeds and feeds may be accomplished while the machine is in operation.

Numerical control can select travel of head, spindle, table and/or saddle, unclamp units when in motion and clamp when directed. Other functions—tapping cycle, changing of feeds and speeds, spindle power tool lock clamps or ejects tools, spindle dwell, coolant "on" or "off", orientation of spindle stop at a desired point of rotation when using tool magazine, simultaneous motion of unit travels, dual storage of information.

One piece or production runs . . . 2¾", 3", 4", 5", 6" or 7" spindle-diameter models, simple jobs or complex jobs, Lucas has the right horizontal and vertical boring, drilling and milling machines with the controls you need. See your Lucas representative or write Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Ave., Cleveland, Ohio.



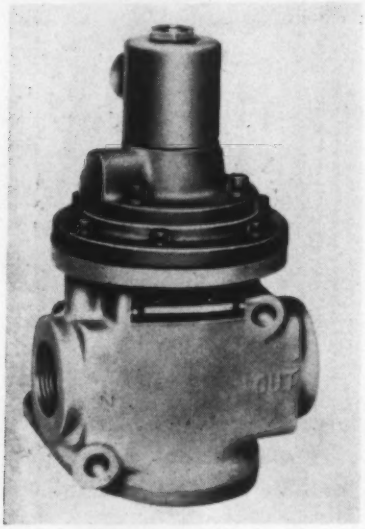
LUCAS
PRECISION

disconnect terminal block. These units are ideal for the control of industrial processes such as vacuum metalizing, bonderizing, temperature programming and radiology, to name just a few. They are also useful in laboratory and in machine automation. (Automatic Timing & Controls)

For more data circle No. 46 on postcard, p. 99

Poppet-Type Valves

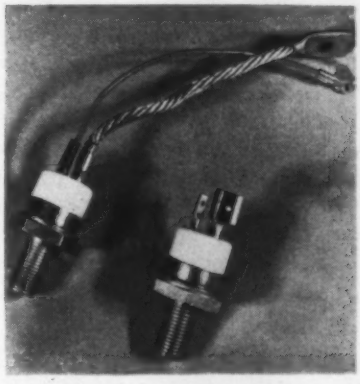
A new basic 1 in., poppet-type, two-way, in-line air control valve is available either normally open or normally closed. It's intended for on-off control where air is used for processing or fluid power applications. The valve is designed for service from vacuum to 200 psig. and is available in 3/4, 1 and 1¼ in. NPT port sizes. The valve design makes full use of the advanced features of poppet valves including removable and reversible seals, fewer parts. The standardized parts are interchangeable with the parts of other valves in the line, and full cushioning of moving parts prevents impact damage. (Hoffman Valves, Inc.)



For more data circle No. 47 on postcard, p. 99

Power Transistors

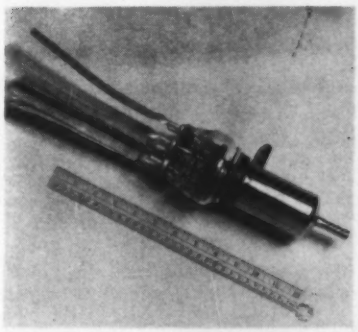
Improved characteristics for 30-amp NPN silicon-power transistors feature saturation resistances of 0.037 ohms, low thermal impedance, 250-w continuous power dissipation, over 5000-w pulse power dissipation and voltage ratings through 200 v. The unique design of these units also provides freedom from secondary breakdown within the maximum voltage and current ratings. These new features, coupled with the 30-ampere collector rating and the new 175°C maximum junction temperature, mean that these transistors permit new dimensions in circuit design. (Westinghouse Electric Corp.)



For more data circle No. 48 on postcard, p. 99

Three-Element Tube

A new three-element power amplifier and oscillator tube for induction and dielectric heating applications requires relatively high kilowatt output at a minimum of investment. The new tube is also particularly suitable for use as a "building block" to increase the output of 5-, 10- and 15-kilowatt r-f generators by adding tubes in parallel. Electrically equivalent to WL 7215 tubes, the WL 7255 has flying leads for easier mounting and for minimizing strain in glass near the tube connection. Other applications in-



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CONSISTENTLY DEPENDABLE STAINLESS BAR STOCK

From melt to finished product, Republic Stainless Steels are produced at *one* location, under one *continuous* system of quality control, using the *latest* production and laboratory equipment. Republic, world's largest producer of stainless and alloy steels, has the largest alloy bar rolling capacity in the industry.

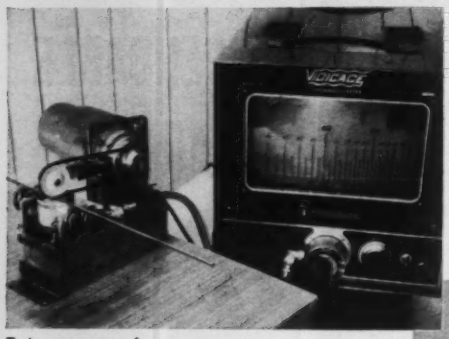
REPUBLIC STEEL

clude service in lining Class B amplifiers of sonar and ultrasonic systems. (Westinghouse Electric Corp.)
For more data circle No. 49 on postcard, p. 99

Dry-Casting Powder

Primarily designed for easy, low-cost potting, this one-component, epoxy-based material handles much the same as a dry, coarse powder. It requires no preparation prior to use. Named Dri-Cast, the powder boasts outstanding electrical characteristics and exceptionally-high thermal conductivity. After curing, this conductive property greatly aids in dissipating heat around transformer windings. In addition, linear shrinkage is less than 1 pct. Thermal and physical shock properties are also excellent. These features make the new epoxy attractive for a variety of potting uses. Two types are available. The first is blue in color with a high-density and packing factor. The second is green and of a more porous nature. It serves as a matrix for oil impregnation. (Hysol Corp.)
For more data circle No. 50 on postcard, p. 99

ANOTHER ULTRASONIC FIRST...
THICKNESS GAGING WITHOUT CONTACT



Tube scanner for VIDIGAGE® thickness gaging without contact.

Thickness gaging by means of the ultrasonic resonance technique can now be accomplished by immersion without contact. This is extremely advantageous because:

- it eliminates transducer wear
- maintains uniform coupling of energy between transducer and work surface (this in turn makes the test more reliable!)
- avoids possible damage to work surface caused by transducer contact
- substantially increases inspection speeds

When the water column is of sufficient length the VIDIGAGE® does not respond to the water resonances. As a result the resonance thickness of the work piece can be detected by itself on the VIDIGAGE screen.
In order to take full advantage of this immersion system, the VIDIGAGE had to be modified. The modified VIDIGAGE then surpassed all expectations, especially in the gaging of small diameter, high accuracy tubing.

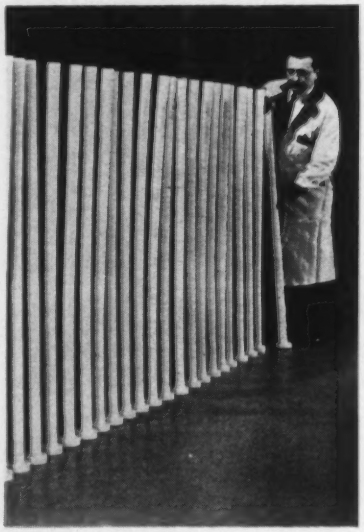
This development is another in the long line of BRANSON engineering breakthroughs, which enables industry to solve its problems by means of ultrasonic testing. The next time you have a testing problem call BRANSON and see how fast BRANSON will find the best solution in the shortest possible time.

SINCE 1946 — THE RESPECTED NAME IN ULTRASONICS

BRANSON INSTRUMENTS, INC.
Ultrasonic Test Division
23 Brown House Road, Stamford, Conn.

Teflon Steam Jets

Acid-proof steam jets are now available to fit all continuous pickling lines. Made of Teflon, these jets are claimed to increase the service life from a six month average for conventional metallic type to a life of many years. Actual service records reveal their more than four years of continuous service with no signs of corrosion, damage or steam



erosion to date. Jets are available in three configurations to meet all installation requirements. (Crane Packing Co.)
For more data circle No. 51 on postcard, p. 99

Plastic Pipe Fittings

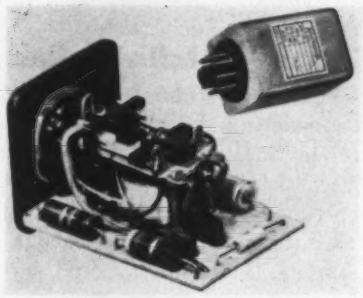
Here's a new line of precision pipe fittings that's furnished in the following plastics; Teflon, Zytol (nylon), PVC, Profax, polyethelene, Plaskon, Penton, Kel-F and Delrin. You can select the right plastic to combat corrosion, chemical reactions and leakage in vacuum lines. Plastics also serve as electrical insulators. In addition, their use reduces installation weight in most cases. Units in the line come in a complete range of shapes and sizes

from 1/16-1 in. nominal pipe diameter. (Cajon Co.)

For more data circle No. 52 on postcard, p. 99

Time-Delay Relay

For industrial use, a new, low-cost, externally-adjustable, time-de-



lay relay boasts transistor control. This unit has two ranges of adjustment, 0.1-10 seconds or 1-60 seconds, made by a remote potentiometer or fixed resistor. Normal operation is "delay on make," SPOT 5-amp contact rating. The relay is available in 12-v or 24-v dc input with a 2-w maximum. Units are mechanical, rating at over 10-million dry-circuit cycles. (Accutronics, Inc.)

For more data circle No. 53 on postcard, p. 99

Sounds the Warning

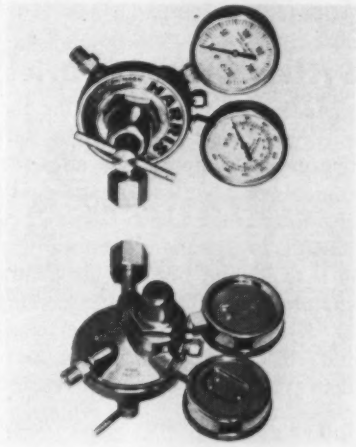
A motion-activated, mechanical safety bell can be locked to ring in either forward or reverse, or in both directions. It can also be adjusted for volume, frequency and regularity of signal. The unit is designed pri-

marily for use on fork-lift trucks and street or highway vehicles operating under nominal noise levels. But, because the new alarm comes in several sizes with adjustable decibel volume, it adapts to just about any type of installation. Mounting brackets are available to fit any type of wheel or hub. (Warn Sales Co.)

For more data circle No. 54 on postcard, p. 99

Flow Regulators

New multi-stage regulators feature an accurate and infinitely-adjustable, first-stage delivery pressure that minimizes variation from static to flowing pressure. This further enables the second stage to control constant flow accurately as the cylinder pressure reduces. The units work within a plus/minus var-



iation of less than ½ lb from the original setting, regardless of decreasing inlet pressure. And, models are available for all commercial gases. (The Harris Calorific Co.)

For more data circle No. 55 on postcard, p. 99

Spray-On Adhesive

Here's a new high-strength, heat-resistant adhesive that sprays on in a relatively-dry form. Contact pressure is all that's needed for bonding a wide variety of materials. These include: polystyrene, sheet plastic, steel, aluminum, wood, particle board and foamed glass. Because of its good filleting properties with the new spray techniques, the rubber-base adhesive is ideal for fabricating honeycomb sandwich panels. Other uses include bonding building or metal panels. (Minnesota Mining & Mfg. Co.)

For more data circle No. 56 on postcard, p. 99

Strong, Modern, Dependable

from your local Stainless Steel Service Center...

PH STAINLESS STEELS

The man to call—your Republic distributor. Republic offers four types of precipitation hardenable stainless steel. Ask for data on Republic PH 15-7 MO*, 17-4 PH*, 17-7 PH*, and A-286.

*Licensed under Pat. Nos. 2482096, 2505763, and Trade Mark of Licensor.

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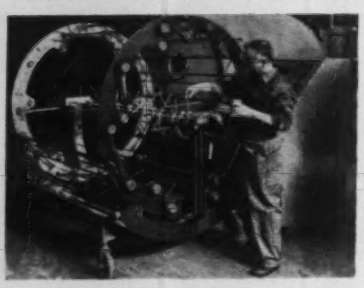
New Equipment and Machinery



Design Changes Upgrade Vacuum-Metallizing Unit

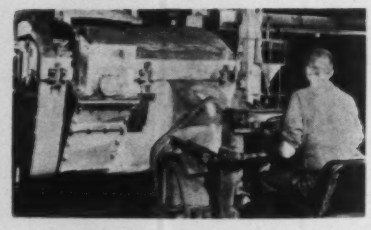
Three major design improvements have been made in the newest version of a 72-in., vacuum-metallizing system. First, the work-holding planetary carriage has been beefed up for maximum rigidity. Faster metal evaporation results from the use of a new type of power system with a 30 kva capacity. And the pumping system has also received attention. It now uses a mechanical booster pump to back up two, 16-in. oil-diffusion pumps. This change ups the gas-handling capacity. (F. J. Stokes Corp.)

For more data circle No. 57 on postcard, p. 99

System Chills and Dries Compressor Intake Air

According to current thinking, the only way to get dry air is by putting drying equipment on after the compressor. Not so, according to engineers at the Lynch Corp. They state the logical and economical way is to chill and dry the air before compression with no after cooling or drying needed. Most manuals state that compressor intake locations should be where the coolest and dryest air is. Lynch contends that the next logical step toward increased efficiency is artificially refrigerating the intake air. And the company has come up with the Coblentz Dry Air System to do just that —chill large volumes of air and wring the moisture out of it at the same time. Operating economies are the practical payoff.

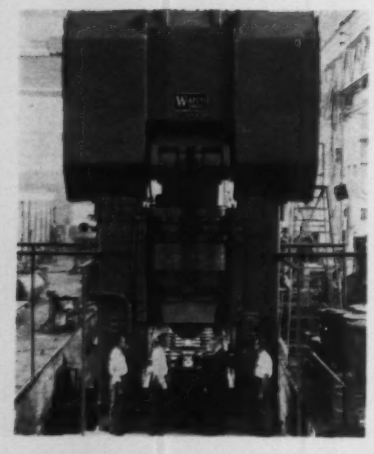
For more data circle No. 58 on postcard, p. 99



Induction Furnace Improves Cast Iron Quality

First American tests on cast iron from a new Tagliaferri induction furnace indicate new gains in foundry technology. Tests were made at Sibley Machine & Foundry Corp. to compare high-quality gray iron, obtained directly from the cupola, and the same iron after refining in the new furnace. Iron quality improved; and there was less scrap loss. (The Hevi-Duty Electric Co.)

For more data circle No. 59 on postcard, p. 99



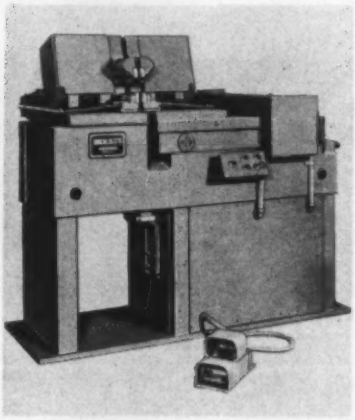
Huge Double-Action Press Packs a 3000-Ton Wallop

Believed to be the largest of its type ever built, this mechanical, double-action press rates at 3000 tons total pressure. Its four-point outer slide is rated at 2000 tons; and a single-point inner slide develops 1000 tons. This pressure arrangement, the reverse of standard double-action presses, performs sizing and coining with the outer slide and cold extrusion with the inner slide, in one operation. While the outer slide holds the part stationary, the inner slide makes contact and extrudes the completed part. In operation, blanks are hand fed into a pick-up station pocket. From there, they feed automatically into a pocket in the die. Completed parts eject automatically onto a conveyor. For easy maintenance, the huge press has pushbutton air cylinders which disconnect the feed drive. This lets the operator work on the dies with a minimum of interference. (Federal-Warco Div., McKay Machine Co.)

For more data circle No. 60 on postcard, p. 99

Flash-Butt Welders

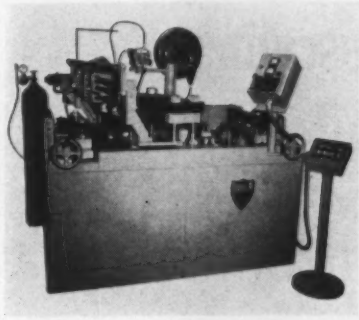
Flash-butt welding is a high-production, resistance-welding method for end-to-end joining of rods, tubes, bars, forgings, fittings, and the ends of formed rings. With the proper equipment for the job, the resulting joint has a strength as great as that of the parent metal. According to the manufacturer, a modern new automatic machine consistently obtains these high-quality results. It features deep side girders that withstand upsetting stresses and reduce deflection to a minimum. This unusually-rigid design insures precise alignment of both the left and right-hand platens during the entire weld cycle. A low-impedance secondary circuit efficiently conducts welding current across the full width of the lower welding dies. Thus, there's always even-current distribution, even when welding wide strips. (Sciaky Bros., Inc.)



For more data circle No. 61 on postcard, p. 99

Shears and Welds

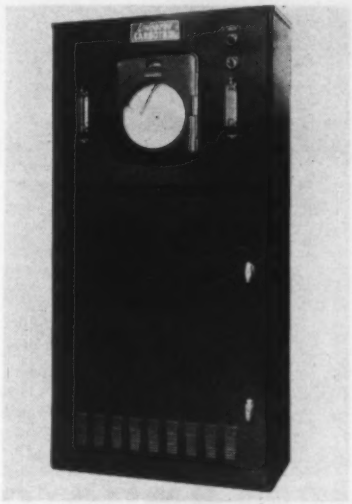
A new automatic combination shear and welder provides continuous strip—any thickness from 0.040-0.250 in.—for roll forming, tube manufacturing, punch-press operation, and coil-strip processing lines. It automatically aligns the trailing end of a processed coil and the leading end of the new coil. Then it clamps both ends, shears, sets the two ends at the proper gap for arc welding, and automatically welds the strips together with little or no increase in joint thickness over the parent metal. Welding speeds range from 90 ipm on 0.060-in. thick steel to 50 ipm on 0.250-in. thick steel. A significant feature of the equipment is its speed. Complete time for clamping, shearing and welding ranges from 40-60 seconds, depending on material thickness and width. Any width from 2-17 in. is suitable for processing on the machine. (Guild Metal Joining Equipment Co.)



For more data circle No. 62 on postcard, p. 99

Carbon Controller

Here's a new instrument that automatically controls the carbon potentials of furnace atmospheres. Named the Infrared Carbotrol, it is a dual-range unit with automatic range switching. The two ranges are 0-0.2 pct carbon dioxide and 0-1.0 pct carbon dioxide. Calibrating gases are conveniently located within the control panel. The instrument can be used in atmosphere control for carburizing, neutral hardening and carbon restoration. It's also good with any dew point



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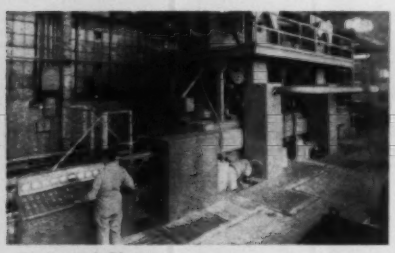
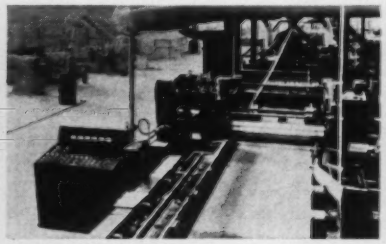
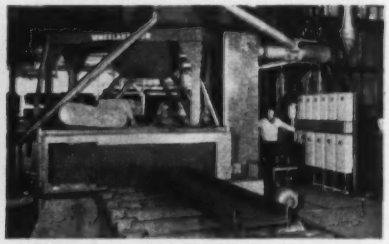


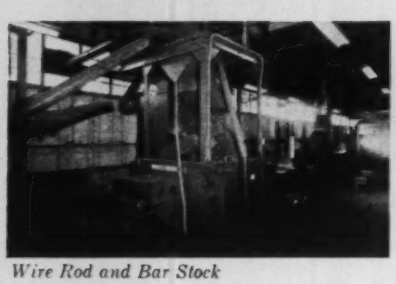
Strip and Sheet



Skelp

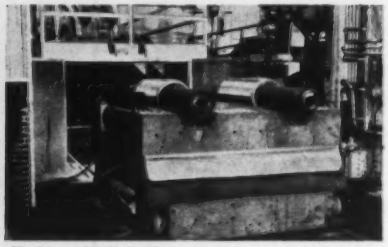


Structural Steel and Plate



Wire Rod and Bar Stock

Inspection of Slabs and Billets



Etching Mill Rolls

A demonstration of WHEELABRATOR'S

VITAL VALUES

VITAL VALUES FOR INDUSTRY

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MECHANICAL DESCALING

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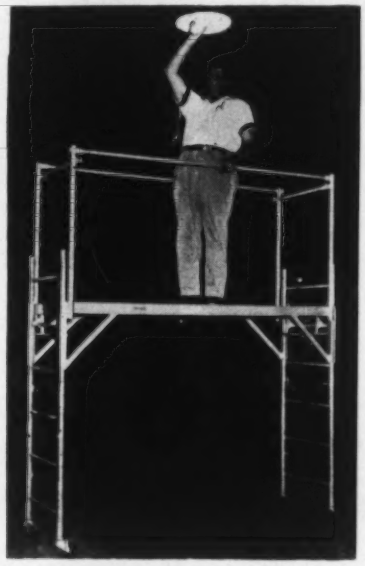
gas. Gases such as ammonia will not affect its operation. (Lindberg Engineering Co.)

For more data circle No. 63 on postcard, p. 99

Maintenance Aid

An economical portable platform for all types of maintenance and repair work consists of just three basic components: A steel and plywood stage; ladder panels; and casters. The unit weighs only 186 lb, and is quickly assembled or taken apart for storage and transportation. Applications for the new platform are practically limitless. It is ideally



suited for general plant upkeep, since it easily straddles 6-ft high machinery or obstructions. By adding standard componets, it can be erected as a continuous scaffold for painting and light construction. The unit can also be adapted to the most-severe uneven ground or floor conditions. (Universal Mfg. Corp.)

For more data circle No. 64 on postcard, p. 99

Speeds Railway Loading

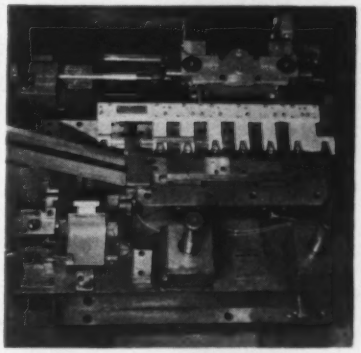
A new air-driven wrench operates most piggyback-trailer hitches two to four times faster than previous methods. The wrench can be used with all trailer hitches made by ACF Industries, Inc. Field tests by ACF's American Car and Foundry Div. were said to have shown that the tool, operating at 300 rpm, elevates the hitch and locks it to the trailer kingpin in 32 seconds. This

compares with the 124 seconds consumed by previously-available power wrenches for TOFC tie-down. The unlocking and lowering process required 25 seconds compared with 92 seconds, the tests showed. Projecting these figures, there's an indicated saving of up to two and one-half hours in loading a 50-car train of flatcars, each equipped to carry two highway trailers. (Chicago Pneumatic Tool Co.)

For more data circle No. 65 on postcard, p. 99

Transfer Versatility

Applying the building-block concept to transfer units, a complete line of mechanical or cylinder-actuated transfer equipment features unusual versatility. For instance, the mechanical-press units are not



tied down to just one press. A die with a transfer unit engineered for a 10-in. stroke press can be run in another press with an equivalent or greater stroke, as long as the press speeds are about the same. With the

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The man to call—your Republic distributor. New bright annealed stainless gives you a better, brighter surface that requires no external coating, little or no final polishing. Republic produces 45 standard types of stainless steel. Key stainless finishing facilities are used only in the production of stainless steel.

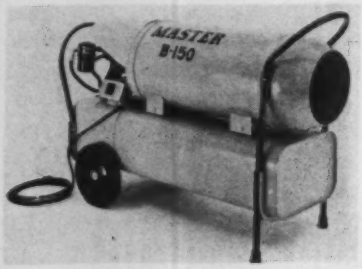
REPUBLIC STEEL

standard cylinder-actuated units as a base, it's easy to design special-purpose units. The building-block construction makes it possible to revamp the transfer unit once its original usage becomes obsolete. (Livernois Engineering Co.)

For more data circle No. 66 on postcard, p. 99

Portable Heater

This new portable circulating warm air heater delivers 150,000 BTU's of circulating warm air per

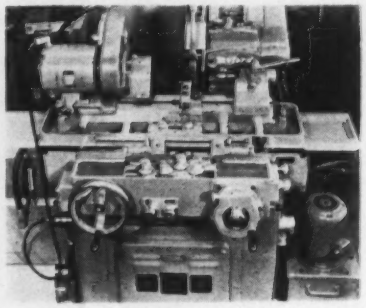


hour. Because it can be used indoors without vents, it's often used for warming workers, heating cold engines and repair sheds, spot heating outdoor and large indoor areas, thawing frozen pump and water lines, and drying materials. This highly portable 80-lb heater can be lifted or wheeled easily by one man wherever it is needed. The worker merely plugs the heater into any 115-v ac outlet and flips the switch. (Master Vibrator Co.)

For more data circle No. 67 on postcard, p. 99

Precision Grinder

This 5 x 12-in. hydraulic cylindrical-grinding machine is the new high-production version of an old line English machine-tool builder's manually-operated unit. Over 250 of the old Myford model are now in use in American plants. While application of the hydraulic system results in exceedingly-high production, the same high standards of repeat accuracy, roundness and surface finish achieved by the original model are to be found in its new companion. Both will hold tolerances in millionths. Specifically, the high-production unit is engineered to grind round to 0.00002-in. parallel within 0.00002-in., repeat to



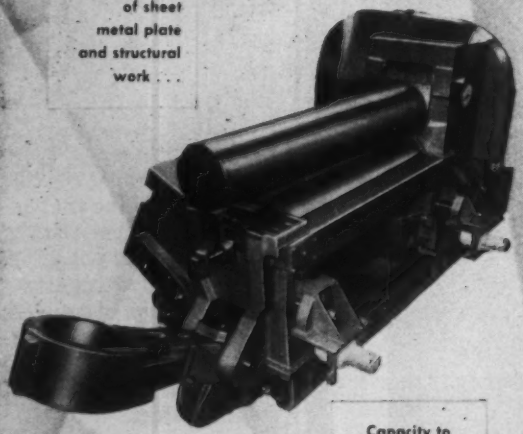
0.00001 in. and finish up to 3 micro-inches. (Bentley Industrial Corp.)

For more data circle No. 68 on postcard, p. 99

Finishes Piece Parts

The development of a new machine for the automatic finishing of dials, emblems, and various piece parts has recently been announced. It consists of a rotary index table with eight spindles. These spindles spin in five stations. And they're available for loading and unloading in three stations. The table can also

Our Line
Light and heavy machinery for all classes of sheet metal plate and structural work . . .



Capacity to 6 inch plate cold
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ORGANIZED 1879, INCORPORATED 1911

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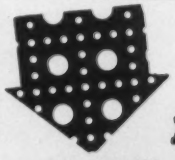
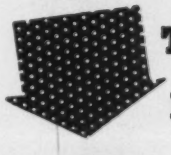
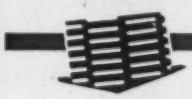
CAMBRIDGE CITY INDIANA



ACCURATE SERVES THE LEADERS IN INDUSTRY...





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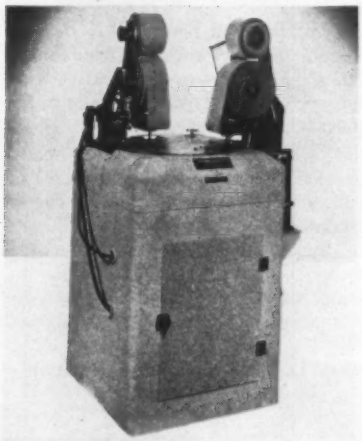
be equipped to accommodate any combination, up to five, of interchangeable accessory heads, including a fill head, a smear wipe, a full wipe, a light buff, and a painting head. Where dials are to be filled with a dial filler, the fill head is used. Upon contact with the spinning part, a controlled amount of dial filler is pushed into the depressions. The spinning part is then indexed to the next accessory, such as the smear wipe. Here, the greater portion of the excess dial filler is removed. Next, the part indexes to the full wipe head where the remaining dial filler is removed and the part polished. After each in-



dexing, the wiping material is slightly indexed on its roll. This provides a clean surface for each piece part. (Conforming Matrix Corp.)

For more data circle No. 69 on postcard, p. 99

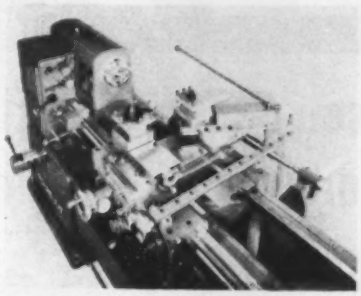
Gages thin Coatings

Lightweight and inexpensive a new electronic thickness gage uses radiation to measure metal films as thin as one ten-millionth of an in. Called a backscatter gage, the instrument uses a radiation source which emits beta rays for rapid, accurate measurements of metal coatings. It was developed to measure extremely-thin gold deposits on printed-circuit boards. However, aside from its use in the printed circuit industry, the instrument will be capable of measuring many other coatings. It is particularly useful on complex and unusual shapes. (Twin City Testing Corp.)

For more data circle No. 70 on postcard, p. 99

Copying Attachments

Designed for both longitudinal and lateral copying, a new hydraulic copying tool is available for a line

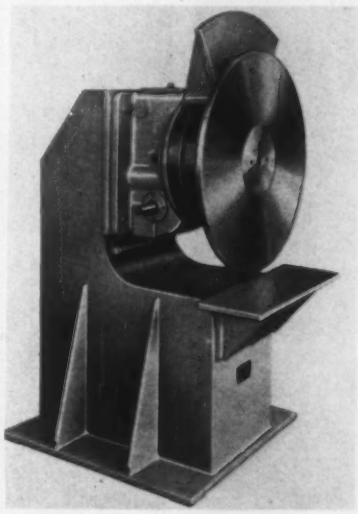


of precision tracer lathes. The slideways on the copying units are chrome plated to minimize wear and are automatically lubricated during operation. The slide has double guideways permitting faceplate work with considerable overhang. A micrometer device allows a finishing cut to be taken immediately after the roughing operation, without removing or adjusting the template or tools. (Cazeneuve Lathes, Inc.)

For more data circle No. 71 on postcard, p. 99

Indexing Machine

A new turret-type, indexing-machine chassis features a vertical indexing table designed to facilitate tooling of sequential automatic machines. This new unit is actually a



modification of a standard chassis. It employs a hardened-tool-steel, cross-over indexing cam that provides a cycloidal-displacement cam path. Main-index camshaft exten-

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REPUBLIC STEEL

LINDE ELECTRIC WELDING

PLASMARC

New...very-thin, fused deposits with controlled dilution
New...high-speed, dross-free cuts in 5-in. thick metals

LINDE, inventor of plasma arc processes, announces *new* PLASMARC weld surfacing and *advanced* PLASMARC cutting. What is plasma arc? It is a flow of gas forced through an electric arc, constricted in a small-bore torch nozzle, and accelerated to form an intense jet. It combines electrical heat with the latent heat of highly-excited ionized gas atoms to reach one of the highest known metal-working temperatures (30,000° F.). It will melt any known metal.

A TRUE WELD

PLASMARC *weld surfacing* is true welding—not coating or plating—achieved by feeding powdered metal through the plasma arc into a weld puddle which freezes to form the deposit. Its precision eliminates excess buildup—ideal for such parts as valves, plowshares, seals . . .

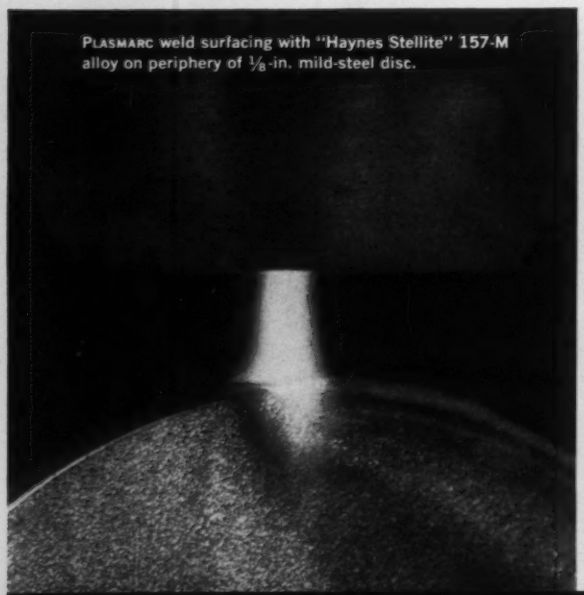
PLASMARC weld surfacing gives precise control of penetration of overlay metal into base metal—as little as .005 in. or higher. Gives precise control of dilution with base metal—from 5% up to 50%. Provides one-pass deposits as thin as .010 in., as thick as 3/16 in., with a wide range of metals and alloys. Produces widths from ⅛ in. to 1 in. or more, speeds over 20 ipm at 95% deposition efficiency, flatter and smoother deposits than other fusion processes.

4000 FT./SEC. VELOCITY

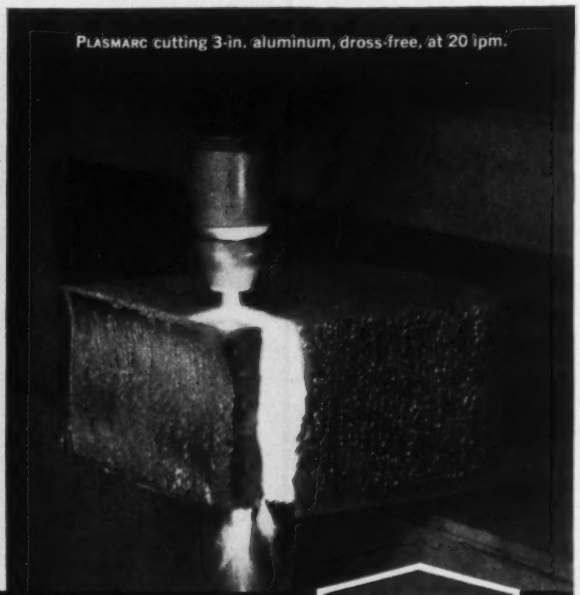
PLASMARC *cutting* uses a near-sonic velocity plasma jet (4000 ft./sec.). It easily melts-and-forces a narrow kerf through both ferrous and non-ferrous metals with little or no change in metallurgical properties. After six years' success, it is replacing shearing, sawing and powder cutting—slower methods which often require machining of the cut edge.

PLASMARC cutting has been further developed—heavy-duty equipment, higher current capacity—to handle increased metal thicknesses. It cuts aluminum, magnesium and copper up to 5-in. thick and stainless steel up to 2 in. thick, dross-free. It clean-cuts 4-in. thick stainless, nickel, carbon steel (requires no iron powder), "Monel," "Inconel," cast iron, high-alloy and clad steels. It makes precise, high-speed cuts up to 300 ipm, holds tolerances to 1/16 in., leaves a heat band as thin as .006-in. wide.

Get full details . . . see a "live" PLASMARC demonstration. Contact your local LINDE office or write direct.



PLASMARC weld surfacing with "Haynes Stellite" 157-M alloy on periphery of ⅛-in. mild-steel disc.



PLASMARC cutting 3-in. aluminum, dross-free, at 20 ipm.

LINDE COMPANY
Division of Union Carbide Corporation
270 Park Avenue, New York 17, N. Y.

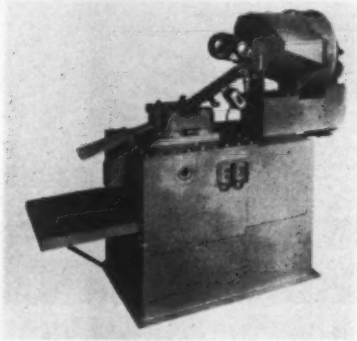
UNION CARBIDE

sions let the user mount operational cams for electric starting of tooling sequences, and for actuating auxiliary camshafts to handle additional tool motions. This new chassis suits many types of assembly, process or test operations which require positive mechanically-actuated intermittent motion in a vertical plane. (Swanson-Erie Corp.)

For more data circle No. 72 on postcard, p. 99

Pinch Pointer

Here's a new, high-speed pinch pointer with a capacity of 400 pieces per minute. It imparts a needle- or diamond-type point to screw blanks of just about any ma-

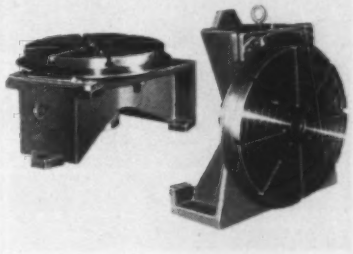


terial. Blank sizes can range from No. 2 up to 5/16 in.; lengths from 9/32-2½ in. All-welded unitized construction guarantees easy upkeep of the pointer machine. Helical gears run in an oil bath. In fact, the entire machine has been designed to be practically maintenance-free. (Behr Machinery & Equipment Corp.)

For more data circle No. 73 on postcard, p. 99

Machining Aid

Here's a new combination rotary table and angle plate that can be used either horizontally or vertically for a wide variety of inspection, layout and machining applications. It's free-wheeling face plate rotates 360° with a radial accuracy, by vernier, to 5 minutes visual reading. And for convenient readings in either horizontal or vertical position, graduations are on a 45° angle. Overall table diameter equals 18 in. Table flatness and runout are within 0.0002 in. Positioning rings and eight T-slots facilitate loading and clamping parts. Also a two-

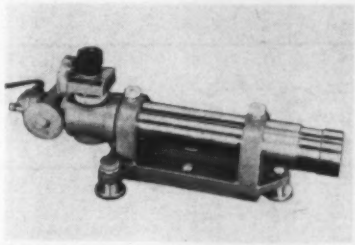


point table lock assures positive locking. As an optional extra there's a precision centering plug and sine bar arrangement for Jo block positioning. (Machine Products Corp.)

For more data circle No. 74 on postcard, p. 99

Autocollimators

This "new generation" instrument, an up-to-date autocollimator, permits direct reading in the horizontal and vertical planes simultaneously—to 0.1 second over a range of 10 minutes of arc. Illuminator and micrometer units are interchangeable, to assemble for straight or right-angle viewing. Also, a larger objective lens produces improved definition and working distances to 100 ft. Another new model has the same features except that it views two planes individu-



ally, without rotating its tube. Both instruments function independently of distance and temperature under normal conditions. They establish squareness, parallelism, flatness, angles and circular spacing for testing surface plates, machine-tool alignment, gear-cutting devices, circular-tables, dividing heads, missile-guidance units and test equipment. (Engis Equipment Co.)

For more data circle No. 75 on postcard, p. 99

Stainless Steel

Strong, Modern, Dependable

Call these Steel Service Centers for **REPUBLIC STAINLESS STEEL**

NEW ENGLAND STATES

Bruce and Cook, Inc.
Stamford, Connecticut

Edgcomb Steel of New England, Inc.
Milford, Connecticut
Boston, Massachusetts
Nashua, New Hampshire
Slatersville, Rhode Island
Bennington, Vermont

MIDDLE ATLANTIC STATES

Abarry Steel Company
Perth Amboy, New Jersey

Atlas Steel Supply Company
Morris Plains, New Jersey

Benedict-Miller, Inc.
Lyndhurst, New Jersey

Fisher Bros. Steel Corp.
Englewood, New Jersey

International Corporation
Hillside, New Jersey

Miller Steel Company, Inc.
Hillside, New Jersey

Atlas Supply Company, Inc.
Bronx 58, New York

Beals, McCarthy and Rogers, Inc.
Buffalo 5, New York

Brace-Mueller-Huntley, Inc.
Buffalo, New York
Rochester, New York
Syracuse, New York

Ernst Iron Works
Buffalo, New York

Follansbee Metals Corp. of New York
Rochester, New York

Hamsley, Inc.
Brooklyn 32, New York

K. & S. Metal Supply, Inc.
Long Island City, New York

Metal Purchasing Company, Inc.
New York 1, New York

Schwarz and Cohn, Inc.
Brooklyn, New York

Straits Aluminum Company, Inc.
Brooklyn 7, New York

Hill-Chase and Company, Inc.
Philadelphia 34, Pennsylvania

Potts-Farrington Company
Philadelphia 29, Pennsylvania

Horace T. Potts Company
Philadelphia 34, Pennsylvania

The Warren Company
Erie, Pennsylvania

Williams and Company, Inc.
Pittsburgh 33, Pennsylvania

EAST NORTH CENTRAL STATES

Chicago Steel Service Company
Chicago 32, Illinois

Hubbell Metals Inc.
Indianapolis 2, Indiana

Huron Steel Company
Detroit 16, Michigan

Meyer Brass & Aluminum
Hazel Park, Michigan

The Ohio Metal & Manufacturing Co.
Dayton 2, Ohio

Vorys Brothers, Inc.
Columbus 8, Ohio

Williams and Company, Inc.
Cleveland 14, Ohio
Cincinnati 29, Ohio
Columbus 8, Ohio
Toledo 12, Ohio

WEST NORTH CENTRAL STATES

Hammond Sheet Metal Company
St. Louis 5, Missouri

Hubbell Metals Inc.
Kansas City 16, Missouri
St. Louis 3, Missouri

E. M. Jorgensen Company
Wichita, Kansas

Marsh Steel Corporation
Wichita, Kansas
North Kansas City 16, Missouri

SOUTH ATLANTIC STATES

Eagle Roofing and Art Metal Works, Inc.
Tampa, Florida

Reynolds Aluminum Supply Company
Jacksonville, Florida
Miami, Florida
Tampa-St. Petersburg, Florida
Atlanta 1, Georgia
Savannah, Georgia
Raleigh, North Carolina
Richmond, Virginia

J. M. Tull Metal and Supply Co., Inc.
Jacksonville, Florida
Miami, Florida
Tampa, Florida
Atlanta 2, Georgia

Atlantic Steel Company
Atlanta 1, Georgia

Hubbell Metals Inc.
Marietta, Georgia

Hill-Chase Steel Company of Maryland
Baltimore 3, Maryland

Vance Iron and Steel Company
Charlotte, North Carolina

Dominion Culvert and Metal Corp.
Roanoke 5, Virginia

EAST SOUTH CENTRAL STATES

Atlantic Steel Company
Birmingham, Alabama

Reynolds Aluminum Supply Company
Birmingham, Alabama
Louisville, Kentucky
Memphis, Tennessee
Nashville, Tennessee

J. M. Tull Metal & Supply Co., Inc.
Birmingham, Alabama

Hubbell Metals Inc.
Louisville, Kentucky
Memphis, Tennessee

Williams and Company, Inc.
Louisville 3, Kentucky

Mid-State Steel, Inc.
Nashville, Tennessee

Siskin Steel and Supply Company, Inc.
Chattanooga, Tennessee

Vance Iron and Steel Company
Chattanooga, Tennessee

WEST SOUTH CENTRAL STATES

Hammond Sheet Metal Company
Fort Smith, Arkansas
Little Rock, Arkansas

Marsh Steel Corporation
Baton Rouge, Louisiana

E. M. Jorgensen Company
Tulsa 5, Oklahoma
Dallas 22, Texas
Houston 1, Texas

MOUNTAIN STATES

Ducommun Metals & Supply Co.
Phoenix, Arizona

E. M. Jorgensen Company
Denver, Colorado
Phoenix, Arizona

Marsh Steel Corporation
Denver 16, Colorado

Pacific Metal Company
Boise, Idaho

Structural Steel and Forge Co.
Salt Lake City, Utah

PACIFIC STATES

Allen Fry Steel Company
Los Angeles, California

Ducommun Metals & Supply Co.
Berkeley 10, California
Los Angeles 54, California
National City, California
Seattle 8, Washington

E. M. Jorgensen Company
Los Angeles 54, California
Oakland 23, California
Seattle 24, Washington

American Steel Warehouse Co.
Portland 14, Oregon

Pacific Metal Company
Portland 9, Oregon
Seattle, Washington

CANADA

Drummond McCall and Co., Ltd.
Toronto, Ontario
Montreal, Quebec

REPUBLIC STEEL

REPUBLIC *Stainless Steel*

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There are two requirements for a top-notch food preparation area: (1) Equipment of good design that eliminates places for bacteria to collect; and (2) Equipment made of lifetime stainless steel—the smoothest, easiest to clean and most bacteria and vermin resisting material you can buy. *It's a better product if it's made of stainless!*

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WASHINGTON, PA.

Stainless Steel

Steel Market Upturn Renewed

After a slight setback, mostly because of the auto strikes, the steel uptrend is back on schedule.

Scattered, but significant indications point to a moderate strengthening in demand.

■ The steel market upturn has resumed at a moderate rate. After several weeks on a plateau, the market has again strengthened. This conclusion is based on scattered, but significant reports of renewed market strength. They include:

New orders are picking up, although not at a similar rate for all mills and localities. But mills with broad product bases indicate the rate of new orders means November will be better than October and December better than November.

No Standouts—The rate of improvement is on a broad base. Although no particular segment of business stands out, the number of users picking up their rate of buying shows there is strength in the economy.

The effects of the auto strikes have been largely digested. Steel mills have moved auto steel that built up during the strike and auto companies are ordering at a normal rate, although not as high as had been hoped for.

Furthermore, recent sales of cars in October have brightened the auto outlook. While a tremendous boom is not likely, a continued run of better auto sales would mean a brisk pickup in steel orders.

Inventories at Bottom—Although there are few signs of inventory building, stocks of steel in the hands of consumers are still low and some moderate buildup is likely before the first of the year.

A further note on the auto strikes: The Ford steel mill, which supplies roughly 50 pct of the company's total steel used, was also shut down by the strikes. This minimizes the effect of the Ford strike on other steel suppliers since the company lost its own steel production.

Forecasts in Reach—In assessing the effects of the recent plateau in the steel market, the Iron Age's original forecast for the fourth quarter was an average operating rate of 75 percent of capacity with a peak of 80 pct being reached before the year's end. These forecasts are still in sight, indicating that the pause, dictated mostly by the auto strikes, was not a severe break.

However, the dip in sales, although slight, may put a crimp in steel company earnings for the fourth quarter. Demand leveled off, at least temporarily, just short of the point where profits begin to rise rapidly.

Low Earnings — The critical point where profits begin to mount is between 75 and 80 percent of capacity. The rate has yet to hit 75 percent and the really profitable level may not be hit until late in the quarter. This will cut fourth quarter profits below the optimistic estimates.

One lesson to be learned from the recent leveling is that the market is in a delicate condition where the week-to-week outlook can change. There is little change in the long-term outlook of gradual improvement through 1961 and a brisk pickup on the strength of inventory building and strike hedging starting about next February.

District Steel Production Indexes 1957-59=100

	Last Week	Two Weeks Ago	Month Ago	Year Ago
North East Coast	111	112	118	88
Buffalo	103	104	99	88
Pittsburgh	105	107	106	73
Youngstown	100	102	100	76
Cleveland	115	127	142	96
Detroit	112	110	148	104
Chicago	108	111	116	91
Cincinnati	128	127	124	88
St. Louis	128	119	89	92
Southern	111	109	101	78
Western	117	119	114	86
U. S. Index	109.6	111.2	113.5	84.8

Source: American Iron & Steel Institute

Steel Production, Composite Prices

Production	Last Week	Two Weeks Ago	To Date 1961	To Date 1960
(Net tons, 000 Omitted)	2,042	2,071	76,664	84,481
Ingot Index				
(1957-59=100)	109.6	111.2	98.0	108.0
Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel base (Cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.44	$66.44	$66.44	$66.41
Scrap No. 1 hvy (Gross ton)	$37.83	$38.83	$39.50	$29.50
No. 2 bundles	$25.17	$25.83	$26.83	$19.83

Buyers Can Play Selling Role

Lack of understanding of government procurement can lose orders for small companies.

This is where the small company PA, with his specialized knowledge, can help.

▪ Purchasing agents in small companies can play a vital role in bringing government business to their companies. The opportunity is now greater than ever.

Officials of the Small Business Administration (SBA) claim that many government orders slip by small companies because the executives of these companies don't understand the "hocus pocus" of government procurement. These men believe that Federal government procurement is a massive and complex thing set up for the "big boys."

This is where a small company buyer can help his company. He knows buying methods and procedures. The government uses the same principles of purchasing that the buyer uses in his company. Buying for the government is just more formal. A buyer in a small company can readily study government buying and advise his company how to go after the business.

Non-Defense Orders — A small company doesn't have to be making defense products to be in line for government business. Recent changes in procurement regulations of the General Services Administration (GSA), have opened selling opportunities as never before for small companies. The GSA is often called the government "housekeeping" agency. It buys a wide variety of civilian-type goods. This might range from door hasps to boilers.

One of the regulation changes: "Procurement be divided into small lots, wherever practicable, in order to attract bids from small business concerns."

The other main buying arm of the government, the Defense Dept., also earmarks an increasingly large volume of its procurement for "exclusive" bidding by small businesses.

Record Buying—This is not just government propaganda. Here is how the government-small business buying picture looked in August (latest data available): Some 3700 contracts were awarded. This is a 69 pct greater number than awarded in August 1960. The value of these contracts was $115 million.

And, during the month, $197 million in proposed government contracts were "earmarked for exclusive future bidding by small businesses." This is an 82 pct increase over the same month in 1960.

Another point for small company PAs to keep in mind: Your company can still win government orders even if its credit or capacity to perform is "borderline." The government often will take a chance.

In August, the SBA issued 22 "certificates of competency." This means the SBA reviewed and passed on 22 companies which had been questioned by the government agency to whom they had submitted bids.

Savings—This paid off for the government as well as for the 22 companies. The SBA estimates savings of about $71,000 will result through contract awards to low-bidding companies that were certified in this way.

A good starting point for some PAs in finding out about government procurement has been in meeting buyers at government installations in their localities. This can lead to an introduction to doing business with the government. Many agencies use the "local purchase method." For example, the purchasing officer at each Air Force base is authorized to buy locally items not supplied to him from a central government source. In such cases, he can give out orders up to $2500 each.

Knowing about government surplus materials disposal can also be of value to purchasing men in small companies.

More on Selling to Uncle Sam:

Here are basic guide books and directories issued by the government that can aid a PA in helping his company get government orders. Issuing agencies are listed below the publications.

Doing Business With the Federal Government
General Services Administration, Washington 25, D. C.

How to Sell to Agencies Within the Department of Defense
Superintendent of Documents, U. S. Government Printing Office Washington 25, D. C.

A Guide to Specifications and Standards of the Federal Government
Field Offices of the Department of Commerce and SBA

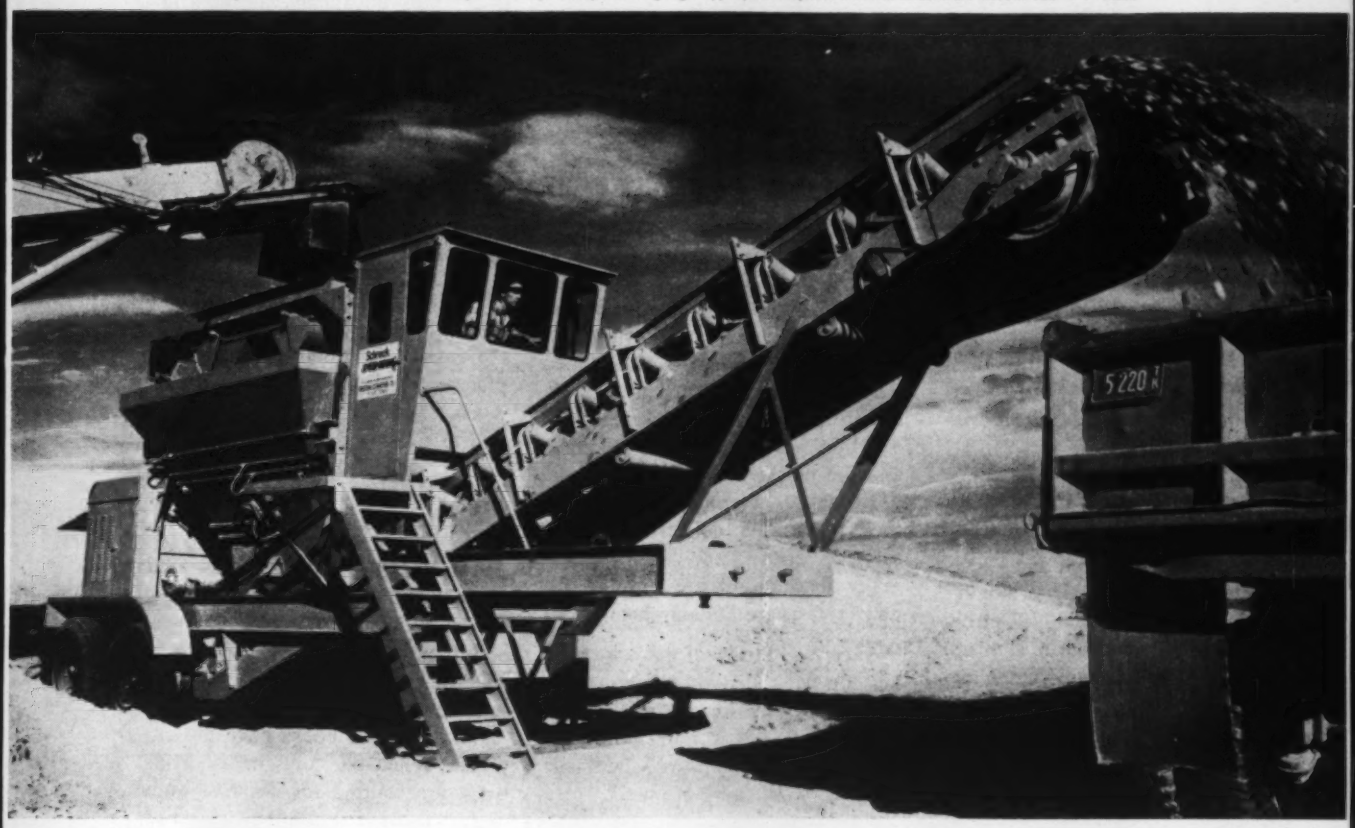
U. S. Government Purchasing and Specifications Directory
Superintendent of Documents

Federal Procurement Regulations
Superintendent of Documents

Armed Services Procurement Regulations
Department of Defense, Washington 25, D. C.

Now **you can get USS "T-1" Steels from Steel Service Centers coast to coast**

New portable weigher and loader eliminates the ordinary truck delays for separate weighing. Hopper parts subjected to severe abrasion are made of USS "T-1" Steel.



USS "T-1" Steel in portable weigher hoppers increases service life 65%... reduces weight 50%

There is something new under the sun in Boise, Idaho. A portable weigher, called the Shrock Speed-Weigh, holds promise of revolutionizing bulk-materials weighing. This unit, designed by the Western Conveyor Company, will weigh and discharge a six-ton load from hopper to truck in 10 seconds. It will handle rock, gravel, coal, iron ore and other aggregate materials.

One of the big problems the designers faced was finding a type of steel that would permit reduction in weight, for mobility, yet be tough enough to take extreme abrasive punishment. U. S. Steel was asked to help. Tests proved that USS "T-1" Constructional Alloy Steel would solve the problem.

To assure long maintenance-free operation in spite of high tonnages and extremely abrasive conditions, parts of the surge-hopper, the weigh-hopper and the gates were lined with ¼" plates of USS "T-1" Steel. A total of 2,188 pounds of "T-1" Steel was used for these applications resulting in a weight saving of 50%. Liner life was increased by 65%. In addition to the "T-1" Steel used, 14,680 pounds of USS structurals, angles, channels, sheets, plates and bars go into each bulk weigher also.

Other equipment where USS "T-1" Steel saves money. For power shovel and dragline buckets, scrapers, bulldozers, truck liners, equipment haulers—wherever extra high strength is needed with impact abrasion resistance and weldability—USS "T-1" Steel results in longer life and freedom from breakdowns. USS "T-1" Steel and the new lower priced "T-1" type A Steel can be furnished to a minimum yield strength of 100,000 psi, or a minimum hardness of 321 Brinell, depending on application. USS "T-1" Steel can also be furnished to 360 Brinell. All of these tough, weldable steels can reduce weight and increase the strength and life of your equipment. Call your local Steel Service Center for more information. Or, for the name of the distributor of USS "T-1" Steels nearest you, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS and "T-1" are registered trademarks.

United States Steel Corporation • Columbia-Geneva Steel Division • National Tube Division • Tennessee Coal and Iron Division • United States Steel Export Company

USS United States Steel

Deliveries Reflect Mild Market Upturn

Mill delivery estimates hold at previous levels as moderate sales gains continue.

Reflecting improved auto production outlook, Detroit area mills quote longer deliveries on bar and stainless.

■ Mill delivery estimates reflect the modest improvement in the market. In two areas, Pittsburgh and Cleveland, they held firm at last month's levels. In others, notably Detroit, there are some increases in shipping estimates. And, in a few cases, deliveries shortened, reflecting the easing of recent weeks.

Both bar and stainless deliveries stretched out at Detroit area mills, indicating the improved auto labor situation. On the West Coast, pipe deliveries increased, while cold-rolled strip declined about a week.

Clear Pattern Lacking — Both sheet and strip deliveries eased a week in the Chicago area as mills adjusted output to demand. On the East Coast, light plate shortened a week.

All this makes clear the lack of a uniform pattern in deliveries. The situation varies with the product and the market.

Buyers, as a group, also vary in their approach to deliveries. Among service centers, for example, as many distributors are pushing up deliveries as are holding them up.

Sheet and Strip—If the auto market for flat-rolled products catches fire, mills look for a stretchout in deliveries. As it is now, producers are hoping for improved bookings in November and December. Auto industry shutdowns have hurt October sheet shipments for some mills. But the situation varies from one mill to another. A **Pittsburgh** sheetmaker says carryover orders will inflate October shipments.

New orders continue coming in at a mildly advancing rate at **Midwest** mills. But, even so, deliveries eased off slightly. There are isolated reports of warehouse inventory building, but these are scattered.

Enameled and zinc-coated products continue pacing the flat-rolled market. Galvanized is about 4-6 weeks for most mills, with some a little farther out.

Plates and Shapes—Demand and deliveries have leveled off at about the rate of late September. Heavy plate deliveries remain at previous levels, about 3-5 weeks. Light plate deliveries have shortened a week in **East Coast** markets. Plate specialties, such as heads, and alloy plate are doing better than carbon plate.

Bar—Orders in this market area show little change, either up or down. For many mills, October looks no better than September. With lead times still short, mills are unable to estimate November tonnages. Auto cutbacks have hurt.

Hot-rolled bar mills in the **Midwest** are waiting for stronger auto industry ordering and new orders of farm equipment makers.

Tinplate — Mill stocks remain high. Can companies have placed orders on this, but haven't approved shipment as yet. Tinplate customers are entering some new orders and releasing them, but the producers still carry heavy stocks.

Fabricated Steel — Fabricators handling small construction jobs are busy. But large-scale construction jobs are limited. Highway work is slow in some areas, especially along the **East Coast.** Fabricators are cautious in their steel buying, as bidding remains competitive.

Pipe and Tubing—Oil country seamless is relatively strong, although mills say it is down from the late summer level. Standard pipe sales are holding at September levels with most customers still ordering on a day-to-day basis. Linepipe orders have fallen off seasonally.

Delivery Promises at a Glance

	East	Pittsburgh	Cleveland	Detroit	Chicago	West Coast
CR Carbon Sheet	3–5 wks	3–5 wks	4–6 wks	4–5 wks	4–6 wks	6 wks
HR Carbon Sheet	3–4 wks	3–4 wks	3–4 wks	2–4 wks	3–5 wks	6 wks
CR Carbon Strip	3–5 wks	4–5 wks	4–6 wks	4–5 wks	4–6 wks	5–6 wks
HR Carbon Strip	3–4 wks	3–4 wks	3–4 wks	2–4 wks	3–4 wks	6 wks
HR Carbon Bars	2–4 wks	2–3 wks	3–4 wks	1–5 wks	4–5 wks	4–5 wks
CF Carbon Bars	2–4 wks	2–3 wks	Stock–4 wks	1–6 wks	2–4 wks	1–2 wks
Heavy Plate	3–4 wks	4–5 wks			3–5 wks	8 wks
Light Plate	2–3 wks	1–2 wks	3–4 wks		2–4 wks	7 wks
Merchant Wire	Stock	Stock	Stock		3–4 wks	Stock
Oil Country Goods	Stock	Stock	Stock		Stock–4 wks	
Linepipe	Stock	1–4 wks	Stock		3–4 wks	Stock-4 wks
Buttweld Pipe	Stock	Stock	Stock	Stock	2–4 wks	Stock–4 wks
Structurals	2–4 wks	1–2 wks	2–4 wks	1–4 wks	3–4 wks	Stock–4 wks
CR Stainless Sheet	Stock–4 wks	Stock–3 wks	Stock–3 wks	Stock–6 wks		
CR Stainless Strip	Stock–4 wks	Stock–3 wks	Stock–3 wks	Stock–6 wks		

COMPARISON OF PRICES

(Effective Oct. 23, 1961)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Oct. 23 1961	Oct. 16 1961	Sept. 25 1961	Oct. 25 1960
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	14.10
Stainl's C-R strip (No. 302)	49.50	49.50	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchant bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	46.75
Wrought iron bars	14.90	14.90	14.90	14.90
Wire: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.49¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Oct. 23 1961	Oct. 16 1961	Sept. 25 1961	Oct. 25 1960
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.68	$70.68	$70.68	$70.11
Foundry, South Cin'ti.	71.92	71.92	71.92	71.79
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.11	70.11	70.11	69.61
Basic Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese 74-76 pct Mn. Cents per lb‡	11.00	11.00	11.00	11.00
Pig Iron Composite: (per gross ton)				
Pig iron	$66.44	$66.44	$66.44	$66.32
Scrap: (ton gross ton)				
No. 1 steel, Pittsburgh	$36.50*	$37.50	$37.50	$28.50
No. 1 steel, Phila. area	39.50*	40.50	40.50	33.50
No. 1 steel, Chicago	37.50*	38.50	40.50	26.50
No. 1 bundles, Detroit	32.50*	33.50	35.50	23.50
Low phos., Youngstown	39.00*	41.00	43.50	27.50
No. 1 mach'y cast., Pittsburgh	45.50	45.50	45.50	45.50
No. 1 mach'y cast. Phila.	49.50	49.50	49.50	48.50
No. 1 mach'y cast., Chicago	47.50*	48.50	50.50	41.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$37.83*	$38.83	$39.50	$29.50
No. 2 bundles	25.17*	25.83	26.83	19.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.75-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	$31.00	$31.00	$31.00	$33.00
Copper, Lake, Conn.	31.00	31.00	31.00	33.00
Tin, Straits, N. Y.	120.25†	121.00**	121.75	103.125
Zinc, East St. Louis	11.50	11.50	11.50	13.00
Lead, St. Louis	11.00	11.00	11.00	11.80
Aluminum, ingot	24.00	24.00	24.00	26.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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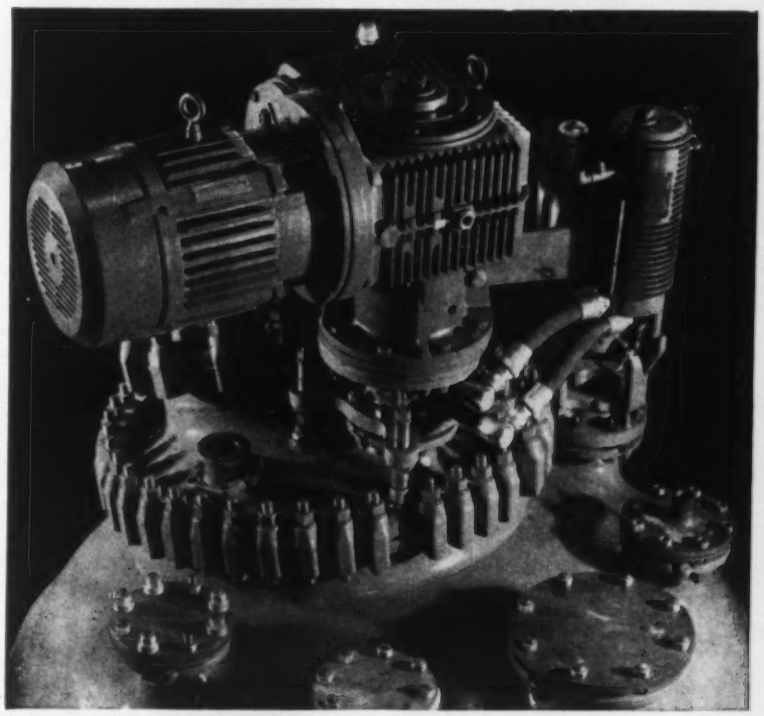
*Appears in the Oct. 19-Nov. 2 issues.



ROCHESTER, N. Y.—The Pfaudler Co. reports space savings and reduced maintenance on their new line of TW Agitation Drives for glassed-steel and alloy mixing vessels due to vertical hollow-shaft double-enveloping worm gear reducers by Cone-Drive Gears, Division Michigan Tool Co., 7171 E. McNichols, Detroit 12, Michigan.

Weak Market Brings Declines

Scrap prices are down again this week, fourth straight week of falling prices.

All areas report weakness. Most dealers expect further drops, but look for improvement early in 1962.

▪ Prices are still dropping in key market areas. Definite weakness has entered a market that, just one month ago, was at its strongest level of the year.

It's the fourth straight week of falling prices, with latest drops averaging $1 across the nation. Some scrapmen feel the market is settling to an adjustment point. Further price falls are expected in some areas. But hopes are strong for a pickup again in the first quarter of '62.

Domestic interest is still missing. Scattered mill purchases are at lower prices. And industrial lists are coming in weaker.

Export remains the stabilizing factor in the East. But orders continue to be spreading into the first of the year. The export buying pace is steady, but much less than was expected.

The Iron Age composite price for No. 1 heavy melting dropped to $37.83, from $38.83, on the basis of price drops in Pittsburgh, Chicago and Philadelphia. The No. 2 bundles composite price dropped to $25.17, from $25.83.

Pittsburgh—Prices of top scrap grades dropped $1 or more this week. It reflects the lack of local demand, along with weakness in other markets. Lack of trading makes it difficult to peg the market. However, spot lots of No. 1 heavy melting have been sold at prices down to $36 to the dealer. This points strongly to future sales at lower levels. Brokers look for industrial grades to be hardest hit by the market weakening. These made the biggest gains in the recent upswing. No. 2 bundles seem to be holding around $27. A local mill is still paying this price.

Chicago — Scrap began moving out of the district as prices again slipped in this market. Railroad lists moved to other areas. Mill buying dried up as mills pulled back to see how far the downward trend would drift. Broker buying prices are off sharply. Material for export continues to move, but it can't offset the price sag.

Philadelphia—No. 1 steelmaking grades are off $1 this week as the market follows the national trend. Export continues to be the big factor. It is steady, but orders through the fourth quarter are tapering off. Brokers and dealers expect further pressure on prices. This week's price drop, after eight weeks of stable prices, is on the basis of a large buy by a major district mill.

New York—This market is definitely weaker. Export buyers are holding back, anticipating lower prices. With good scrap supplies and general weakness at all U. S. scrap centers, dealers expect further price drops. Steelmaking grades are down $1 on appraisal.

Detroit—A price drop of about $3 from a month earlier is predicted for November industrial list No. 1 grades. Late last week, Ford Motor Co. sold several thousand tons of bundles and busheling for October delivery at $3 per ton less than the first of the month. Dealers aren't selling. They say mills are covered with industrial material. Chrysler Corp., facing a possible strike, is offering 25 pct more scrap in November than this month. The company guarantees 90 pct delivery on the amount of scrap bid on if there is a strike.

Cleveland—Market has dropped $2 on appraisal, here and in the Valley, as big mills continue uninterested. Most have excess hot metal and ample inventories. Incoming scrap shipments are being held up regularly, due to heavy traffic jams at mill yards. Production lists late this week are also expected to sag.

Cincinnati—Market is off $1 on appraisal and could fall further. One big mill will likely stay out again.

St. Louis—Market here is very weak. Further price cuts are expected. Supplies are heavy and mills are not buying great tonnages.

Birmingham—With buying at a standstill, and no improvement in sight for November, brokers have cut prices $2 per ton on most items. An Alabama openhearth consumer and a large Birmingham electric furnace have held up shipments bought earlier.

Buffalo—Although market stayed inactive, cast scrap continues to show strength. New purchases were made $1 above quoted prices.

Boston—No. 1 dealer bundles and No. 1 busheling dropped another $1 this week. But No. 1 heavy melting is steadying. The market continues quiet.

Houston—A district mill entered the market with orders for premium grades. Some orders extend to November 15, others to November 30. Despite this buy, prices on some grades dropped $2 a ton. Brokers forecast further weakness.

West Coast—Prices fell $2 to $3 per ton in all top steelmaking grades along the Coast. Many dealers expect a repeat drop soon.

SCRAP PRICES *(Effective Oct. 23, 1961)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 dealer bundles	37.00 to 38.00
No. 1 factory bundles	44.00 to 45.00
No. 2 bundles	26.00 to 27.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	15.00 to 16.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	19.00 to 20.00
Low phos. punch'gs plate	44.00 to 45.00
Heavy turnings	31.00 to 32.00
No. 1 RR hvy. melting	41.00 to 42.00
Scrap rails, random lgth.	46.00 to 47.00
Rails 2 ft and under	51.00 to 52.00
RR specialties	46.00 to 47.00
No. 1 machinery cast.	45.00 to 46.00
Cupola cast.	37.00 to 38.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	190.00 to 195.00
18-8 turnings	115.00 to 120.00
430 bundles and solids	85.00 to 90.00
410 turnings	55.00 to 60.00

Chicago

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 dealer bundles	38.00 to 39.00
No. 1 factory bundles	42.00 to 43.00
No. 2 bundles	23.00 to 24.00
No. 1 busheling	37.00 to 38.00
Machine shop turn.	17.00 to 18.00
Mixed bor. and turn.	19.00 to 20.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	19.00 to 20.00
Low phos. forge crops	46.00 to 47.00
Low phos. punch'gs plate, ¼ in. and heavier	44.00 to 45.00
Low phos. 2 ft and under	42.00 to 43.00
No. 1 RR hvy. melting	41.00 to 42.00
Scrap rails, random lgth.	47.00 to 48.00
Rerolling rails	59.00 to 60.00
Rails 2 ft and under	50.00 to 51.00
Angles and splice bars	45.00 to 46.00
RR steel car axles	58.00 to 59.00
RR couplers and knuckles	45.00 to 46.00
No. 1 machinery cast.	47.00 to 48.00
Cupola cast.	40.00 to 41.00
Cast iron wheels	36.00 to 37.00
Malleable	45.00 to 46.00
Stove plate	34.00 to 35.00
Steel car wheels	43.00 to 44.00
Stainless	
18-8 bundles and solids	175.00 to 180.00
18-8 turnings	105.00 to 110.00
430 bundles and solids	90.00 to 95.00
430 turnings	50.00 to 55.00

Philadelphia Area

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	35.00 to 36.00
No. 1 dealer bundles	41.00 to 42.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	41.00 to 42.00
Machine shop turn.	13.00 to 14.00
Mixed bor. short turn.	16.00 to 17.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Clean cast. chem. borings	29.00 to 30.00
Low phos. 5 ft and under	43.00 to 44.00
Low phos. 2 ft punch'gs	44.00 to 45.00
Elec. furnace bundles	43.00 to 44.00
Heavy turnings	27.00 to 28.00
RR specialties	45.00 to 46.00
Rails, 18 in. and under	53.00 to 54.00
Cupola cast.	39.00 to 40.00
Heavy breakable cast.	41.00 to 42.00
Cast iron car wheels	43.00 to 44.00
Malleable	48.00 to 49.00
No. 1 machinery cast.	49.00 to 50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	9.00 to 10.00
Shoveling turnings	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Low phos. 18 in. and under	41.00 to 42.00
Rails, random length	41.00 to 42.00
Rails, 18 in. and under	47.00 to 48.00
No. 1 cupola cast.	34.00 to 35.00
Heavy breakable cast.	30.00 to 31.00
Drop broken cast.	44.00 to 45.00

Youngstown

No. 1 hvy. melting	$36.50 to $37.50
No. 2 hvy. melting	26.50 to 27.50
No. 1 dealer bundles	36.50 to 37.50
No. 2 bundles	22.00 to 23.00
Machine shop turn.	17.00 to 18.00
Shoveling turnings	19.00 to 20.00
Low phos. plate	38.50 to 39.50

Cleveland

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	34.00 to 35.00
No. 1 factory bundles	38.00 to 39.00
No. 2 bundles	20.50 to 21.50
No. 1 busheling	34.00 to 35.00
Machine shop turn.	14.00 to 15.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Cut structural & plates, 2 ft & under	38.50 to 39.50
Low phos. punch'gs plate	35.00 to 36.00
Drop forge flashings	34.00 to 35.00
Foundry steel, 2 ft & under	34.50 to 35.50
No. 1 RR hvy. melting	38.00 to 39.00
Rails 2 ft and under	47.00 to 48.00
Rails 18 in. and under	50.00 to 51.00
Steel axle turnings	26.00 to 27.00
Railroad cast.	44.00 to 45.00
No. 1 machinery cast.	44.00 to 45.00
Stove plate	38.00 to 39.00
Malleable	49.00 to 50.00
Stainless	
18-8 bundles	180.00 to 185.00
18-8 turnings	105.00 to 110.00
430 bundles	85.00 to 90.00

Buffalo

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 busheling	31.00 to 32.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	15.00 to 16.00
Low phos. plate	37.00 to 38.00
Structural and plate, 2 ft and under	39.00 to 40.00
Rails 2 ft and under	50.00 to 51.00
Scrap rails, random lgth.	40.00 to 41.00
No. 1 machinery cast.	44.00 to 45.00
No. 1 cupola cast.	38.00 to 39.00

St. Louis

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	29.00 to 30.00
Foundry steel, 2 ft.	31.00 to 32.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	23.00 to 24.00
Machine shop turn.	14.50 to 15.50
Shoveling turnings	16.50 to 17.50
Cast iron borings	23.00 to 24.00
No. 1 RR hvy. melting	37.00 to 38.00
Rails random lengths	40.00 to 41.00
Rails, 18 in. and under	45.00 to 46.00
RR specialties	41.00 to 42.00
Cupola cast.	35.00 to 36.00
Heavy breakable cast.	32.00 to 33.00
Stove plate	31.00 to 32.00
Cast iron car wheels	34.00 to 35.00
Rerolling rails	56.00 to 57.00
Unstripped motor blocks	34.00 to 35.00

Birmingham

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	38.00 to 39.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	9.00 to 10.00
Electric furnace bundles	38.00 to 39.00
Elec. furnace, 3 ft & under	36.00 to 37.00
Bar crops and plate	42.00 to 43.00
Structural and plate, 2 ft.	41.00 to 42.00
No. 1 RR hvy. melting	36.00 to 37.00
Scrap rail, random lgth.	40.00 to 41.00
Rails, 18 in. and under	44.00 to 46.00
Angles and splice bars	44.00 to 45.00
No. 1 cupola cast.	40.00 to 41.00
Stove plate	40.00 to 41.00
Cast iron car wheels	33.00 to 34.00
Unstripped motor blocks	29.00 to 30.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	23.00 to 24.00
No. 2 dealer bundles	17.00 to 18.00
Mixed bor. and turn.	5.00 to 6.00
Machine shop turnings	5.00 to 6.00
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	19.00 to 20.00
No. 1 machinery cast.	38.00 to 39.00
Mixed yard cast.	34.00 to 35.00
Heavy breakable cast.	32.00 to 33.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	65.00 to 70.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	32.00 to 33.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	30.00 to 31.00
Drop forge flashings	30.00 to 31.00
Machine shop turn.	12.00 to 13.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Heavy breakable cast.	28.00 to 29.00
Mixed cupola cast.	31.00 to 32.00
Automotive cast.	42.00 to 43.00
Stainless	
18-8 bundles and solids	175.00 to 180.00
18-8 turnings	80.00 to 85.00
430 bundles and solids	70.00 to 75.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$28.50 to $29.50
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	28.50 to 29.50
No. 2 bundles	18.00 to 19.00
No. 1 busheling	28.50 to 29.50
Machine shop turn.	4.00 to 5.00
Shoveling turnings	9.50 to 10.00
Clean cast. chem. borings	17.50 to 18.50
No. 1 machinery cast.	38.00 to 39.00
Mixed cupola cast.	30.00 to 31.00
Heavy breakable cast.	30.00 to 30.50

San Francisco

No. 1 hvy. melting	$40.00 to $41.00
No. 2 hvy. melting	36.00 to 37.00
No. 1 dealer bundles	31.00 to 33.00
No. 2 bundles	.... 25.00
Machine shop turn.	.... 17.00
Cast iron borings	.... 17.00
No. 1 cupola cast.	.... 50.00

Los Angeles

No. 1 hvy. melting	.... $40.00
No. 2 hvy. melting	$35.00 to 37.00
No. 1 dealer bundles	31.00 to 33.00
No. 2 bundles	.... 25.00
Machine shop turn.	.... 16.00
Shoveling turnings	.... 16.00
Cast iron borings	.... 16.00
Elec. furnace 1 ft and under (foundry)	.... 48.00
No. 1 cupola cast.	47.00 to 48.00

Seattle

No. 1 hvy. melting	$41.00 to $42.00
No. 2 hvy. melting	36.00 to 37.00
No. 2 bundles	.... 25.00
No. 1 cupola cast.	.... 36.00
Mixed yard cast.	.... 31.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	.... $30.00
No. 2 hvy. melting cut 3 ft and under	.... 27.00
No. 1 dealer bundles	.... 31.00
No. 2 bundles	.... 23.50
Mixed steel scrap	.... 22.00
Bush., New fact., prep'd.	.... 30.00
Bush., new fact., unprep'd.	.... 24.00
Machine shop turn.	.... 8.00
Short steel turn.	.... 12.00
Mixed bor. and turn.	.... 12.00
Cast scrap	.... 32.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	.... $35.00
No. 2 hvy. melting	.... 32.00
No. 2 bundles	.... 22.00
Machine shop turn.	.... 12.00
Shoveling turnings	.... 15.00
Cut structural plate 2 ft & under	$44.00 to 45.00
Unstripped motor blocks	28.00 to 29.00
Cupola cast.	36.00 to 37.00
Heavy breakable cast.	28.00 to 29.00

Firm Price Seen For U.S. Copper

Industry executive feels U. S. copper price will stay at 31¢ a lb this year.

Third quarter boom is not materializing, he says. But business is gaining at a slow but steady rate.

■ U. S. producers' copper price of 31¢ per lb seems "reasonably certain" to remain unchanged through the rest of the year.

Dr. Joseph Zimmerman, vice president, Miles Metals Corp., forecast this at the National Assn. of Secondary Materials Industries meeting in Atlantic City last week.

No Boom—It doesn't look like the boom, expected this quarter, is going to fully materialize. Business will continue to improve, says Dr. Zimmerman, but at a fairly slow rate—too slow to be called a boom.

One factor contributing to this steady, rather than spectacular, improvement in copper sales will be the absence of inventory buying. With no shortage or higher prices in sight, there is simply no incentive to build stocks. Besides, fabricators traditionally work stocks to very low levels at the year's end.

Good Outlook — Business for 1962 looks good, says Dr. Zimmerman. He expects the improvement in orders to continue. But it is unlikely that producers will have to push mines to anywhere near capacity to meet demand.

He also points out that copper consumption in Britain is down, and there are signs of the boom in West Germany easing off. Consumers in these countries are known to have unusually heavy stocks.

Best bet is that the stocks will be worked off early in 1962. European buying, therefore, will not match consumption, further removing strain on the U. S. supply.

Strike Issue—On next year's outlook, Dr. Zimmerman cautions that "it would be unprecedented for the world copper industry to be strike-free for a full year."

Projecting current world production and delivery figures for the balance of the year, he figures they should match at about 3.7 million tons. This would be very close to the production record set last year. It also would be a new record for deliveries.

Figures Check—A check of new statistics from the Copper Institute tends to bear out Dr. Zimmerman's claims.

Deliveries to fabricators in September, both inside and outside the U. S., were up from August. But in neither case did deliveries hit levels of last spring.

The figures indicate something else: The U. S. copper market, while balanced, continues to be vulnerable to any upset in supply.

Unsold stocks at refineries dropped in September, both inside and outside the U. S. But, while outside, mostly to Europe, they amount to 6 to 7 weeks supply at the current rate of deliveries, they are well under 3 weeks in the U. S.

Aluminum

If anyone had any doubts that output this year would fall noticeably below the record levels of 1960, these were resolved by the latest figures from the Aluminum Assn.

It would take a record production in the last quarter to even match output in the previous high year—1959. This is very unlikely.

The Assn. reports ouput in September was 159,572 tons, which put output for the third quarter at 491,345 tons. This is the best quarter of 1961, but it doesn't quite match the worst quarter last year.

Total to Date—Production for the first three quarters of 1961 totaled 1.404 million tons. In the first three quarters last year, output was 1.520 million tons, and in the like period in 1959 it was 1.463 million tons.

A bright spot: The industry concedes that if business continues to improve, output for the last quarter of this year may well top the last quarters of both 1960 and 1959.

Tin Prices for the Week

October 17—120.375; October 18—120.875; October 19—120.50; October 20—120.375; October 23—120.25.*

* Estimate.

Primary Prices

(cents per lb.)	current price	last price	date of change
Aluminum Ingot	24.00	26.00	9/25/61
Copper (E)	31.00	30.00	5/16/61
Copper (CS)	31.00	30.00	5/17/61
Copper (L)	31.00	30.00	5/17/61
Lead, St. L.	10.80	11.80	12/13/60
Lead, N. Y.	11.00	12.00	12/13/60
Magnesium Ingot	36.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	81.25	74.00	6/30/61
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	11.50	12.50	1/12/61
Zinc, N. Y.	12.00	13.00	1/12/61

ALUMINUM: 99% Ingot. COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. Other primary prices, pg. 133.

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)
("F" temper except 6061-0)

Alloy	.030-.037	.047-.060	.076-.096	.154-.250
1100, 3003	47.4	46.4	45.4	44.4
5052	54.8	52.0	49.8	46.8
6061-0	53.0	50.3	48.4	47.9

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size"	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 1/2
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated
(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.3

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	147	126	145
Strip, CR	133	114	145
Rod, bar, HR	116	95	116
Angles, HR	116	95	116
Plates, HR	139	116	133
Shot, blocks	...	93	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	56.13	.....	53.61	57.32
Brass, Yellow	49.27	49.56	49.21	53.43
Brass, Low	52.15	52.44	52.09	56.21
Brass, Rod	53.17	53.46	53.11	57.23
Brass, Naval	53.94	60.25	47.75	58.10
Munts Metal	51.94	.....	47.25	.....
Comm. Bz.	54.73	55.02	54.67	58.34
Mang. Bz.	57.71	61.54	51.27	.....
Phos. Bz. 5%	76.97	76.72	77.47	78.90

Free Cutting Brass Rod 34.77

TITANIUM

(Base 30,000 lb. f.o.b. customer's plant)
Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17. Plate HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 32.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be ..... $ 5.00
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.70
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base .... $ 1.31
Cobalt, 97-99% (per lb)... $1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined ..... $29.95 to $36.95
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9% dollars per troy oz.. $ 2.25
Iridium, dollars per troy oz..... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury dollars per 76-lb flask f.o.b. New York ..... $188 to $191
Nickel oxide sinter at Buffalo, N. Y. or other U. S. points of entry, contained nickel 77.50
Palladium, dollars per troy oz.. $24 to $26
Platinum, dollars per troy oz... $82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.)..... 91.375
Thorium, per pg $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
No. 115 ..... 32.00
No. 120 ..... 31.25
No. 123 ..... 30.50
80-10-10 ingot
No. 305 ..... 36.00
No. 315 ..... 33.75
88-10-2 ingot
No. 210 ..... 43.75
No. 215 ..... 40.50
No. 245 ..... 35.75
Yellow ingot
No. 405 ..... 27.50
Manganese bronze
No. 421 ..... 31.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95.5 aluminum-silicon alloys
0.30 copper max. 23.25-23.75
0.60 copper max. 23.00-23.50
Piston alloys (No. 132 type)... 25.00-26.00
No. 12 alum. (No. 2 grade)... 21.25-21.75
108 alloy 21.75-22.25
195 alloy 24.25-24.75
13 alloy (0.60 copper max.)... 23.00-23.50
AXS-679 (1 pct zinc) 21.50-22.50

Steel deoxidizing aluminum notch bar granulated or shot
Grade 1—95-97½% 22.75-23.75
Grade 2—92-95% 21.50-22.50
Grade 3—90-92% 20.50-21.50
Grade 4—85-90% 19.50-20.50

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	27	26¼
Yellow brass	20⅜	18½
Red brass	23⅞	23⅛
Comm. bronze	24⅝	24
Mang. bronze	19¼	18½
Free cutting rod ends	19½	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 27¼
No. 2 copper wire 25¼
Light copper 23
*Refining brass 24
Copper bearing material 23
*Dry Copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 27¼
No. 2 copper wire 25¼
Light copper 23
No. 1 composition 24½
No. 1 comp. turnings 24
Hvy. yellow brass solids 18½
Heavy yellow brass turnings. 17½
Radiators 20
Aluminum
Mixed old cast. ..... 12 —12½
Mixed new clips ..... 14 —14½
Mixed turnings, dry ..... 13 —13½

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 23½—24
No. 2 copper wire ..... 21½—22
Light copper ..... 19¼—19¾
Auto radiators (unsweated).. 16¼—16½
No. 1 composition ..... 20½—21
No. 1 composition turnings... 20 —20½
Cocks and faucets ..... 16¾—17¼
Clean heavy yellow brass ... 14¼—14¾
Brass pipe ..... 16½—17
New soft brass clippings .... 18¼—18¾
No. 1 brass rod turnings .... 16 —16½

Aluminum

Alum. pistons and struts .... 7 — 7½
Aluminum crankcase ..... 9½—10
1100 (2s) aluminum clippings 11¾—12¼
Old sheet and utensils ..... 9½—10
Borings and turnings ..... 4½— 5
Industrial castings ..... 9 — 9½
2020 (24s) clippings ..... 10½—11

Zinc

New zinc clippings ..... 5 — 5¼
Old zinc ..... 3 — 3¼
Zinc routings ..... 1¾— 2
Old die cast scrap ..... 1¾— 2

Nickel and Monel

Pure nickel clippings ..... 56 —58
Clean nickel turnings 43
Nickel anodes ..... 56 —58
Nickel rod ends ..... 56 —58
New Monel clippings ..... 26 —26½
Clean Monel turnings ..... 18½—19
Old sheet Monel ..... 25 —25½
Nickel silver clippings, mixed. 20
Nickel silver turnings, mixed. 17

Lead

Soft scrap lead ..... 7¼— 7½
Battery plates (dry) ..... 3 — 3¼
Batteries, acid free ..... 2 — 2¼

Miscellaneous

Block tin ..... 90 —92
No. 1 pewter ..... 65 —67
Auto babbitt ..... 46 —47
Mixed common babbitt ..... 10 —10½
Solder joints ..... 15 —15½
Small foundry type ..... 9 — 9½
Monotype ..... 9¼— 9¾
Lino. and stereotype ..... 8½— 8¾
Electrotype ..... 8 — 8¼
Hand picked type shells .... 5¾— 6¼
Lino. and stereo. dross ..... 1¾— 2¼
Electro dross ..... 2½— 3

(Effective Oct. 23, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.					*				7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$99.50 *A2*	$121.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*	8.10 *P2*	5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.425 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3, Y1*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Struthers, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*		5.50 *Y1*			5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, N. Castle, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *B4, M10*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras

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STEEL PRICES

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		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled 18 ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Electro-galvanized	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.		Cokes▲ 1.25-lb. base box	Electro▲▲ 0.25-lb. base box	Thin 0.25 lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*					7.525 *B3*	9.275 *B3*	6.40 *W6, S15*	†Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb. 0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. ▲ COKES: 1.50-lb. add 25¢. ▲▲ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb. 0.25 lb. add 65¢.		Prices are for 50 lb. base box; for 45 lb. deduct 15¢; for 55 lb. add 15¢; for 60 lb. add 30¢.
	Claymont, Del. *												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*					7.575 *A2*					
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*					7.575 *U1*	9.325 *U1*			$9.10 *U1*	$6.25 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*		6.775 *B3*		7.525 *B3*	9.275 *B3* 10.025 *B3**	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	$6.25 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*		6.775 *A7*		7.525 *A7*			Hollowware Enameling 29 ga.—7.85 *U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; 7.95 *G2* at Granite City.		
	Canton-Massillon, Dover, Canfield, Ohio			6.875 *R1, R3*	7.50 *C19*								
	Chicago, Joliet, Ill.	5.10 *W8, A1*						7.525 *U1, W8*		6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*		7.65 *R3*	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*	6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*					7.525 *G3*	9.275 *G3*				
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3, Y1,*		6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*	6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1 Y1,*	$6.25 *U1, I3*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*				7.225 *E2*						
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	7.225 *A7*	6.775 *A7*	7.225 *A7*						
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3*	7.65 *R3*	6.775 *S1*	7.225 *S1†† R3*	7.525 *R3, S1*	9.275 *R3*			$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3*	7.50 *E3*	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3* 10.125 *U1, J3**	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5*	7.50 *W3*		7.225 *W3*	7.525 *W3*	9.275 *W3*		$10.40 *W5, W3*	$9.10 *W5, W3*	$6.40 *W5*** $6.25 *W3*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*			6.775 *Y1*		7.525 *Y1*	9.275 *Y1*	6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*					8.25 *K1*	10.40 *K1*		$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*		6.775 *T2*				6.40 *T2, R3*	$10.40 *T2*	$9.10 *T2*	$6.25 *T2*
	Houston, Texas									6.65 *S2*			

* Hi Str. Low Alloy Galv. ** For 55 lb.; for 60 lb. add 15¢. †† 7.425 at Sharon; Niles is 7.225.

(Effective Oct. 23, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.		Listing reinforcing bar prices has been suspended. Major producers now quote prices only in response to specific inquiries.		6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3, S15*		7.70 *B5*	6.725 *B3,R3, S15*	9.025 *B3,B5, S15*	8.30 *B3*	5.30 *B3*				8.00 *W6, S15*
	Claymont, Del.							5.30 *P2*	6.375 *P2*	7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Milton, Pa.	5.825 *M7*										
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*			6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.											
	Fairless, Pa.	5.825 *U1*										
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.							5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*		7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,13*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*		7.65 *A5,C13, W13*		9.025 *A5, C13,W13*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,W13*
	Detroit, Plymouth, Mich.	5.675 *G3*		7.90 *P3* 7.85 *P8B5H2* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8, H2* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*		7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, Y1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.											8.10 *C9*
	Sterling, Ill.	5.775 *N4*					7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*		7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*		7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.375 *K1*			7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*			6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*		9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*						6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*										
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*					9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*			7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga. Jacksonville, Fla.	5.875 *A8*										8.00 *A8* 8.35 *M4*
	Fairfield, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*		8.10 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*			6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Oct. 23, 1961) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C19 Canfield Steel Co., Canfield, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owensboro, Ky.

H1 Hanna Furnace Corp., Detroit
H2 Hercules Drawn Steel Corp., Toledo, O.

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.
S15 Seaway Steel Div., Roblin-Seaway Ind., Inc., North Tonawanda, N. Y.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.
W13 Western Cold Drawn Steel, Div. of Standard Screw Co., Elyria, O.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery; Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore	$.10	9.60	10.36	10.16	11.35	9.70	9.95	9.75	11.80	17.48	16.48	21.58	20.83
Birmingham		9.11	11.00	11.39	10.10	9.06	9.12	8.91	13.14	18.84	16.65	22.94	22.19
Boston**	.10	10.02	10.50	11.62	12.50	9.93	10.60	10.15	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	9.45	10.20	11.95	11.85	9.55	10.05	9.60	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	9.37	10.35	10.28	11.54	9.21	9.72	9.37	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	9.53	10.41	10.33	11.86	9.59	10.29	9.48	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	9.37[1]	10.81	11.07	11.66	9.45	10.11	9.48	11.48	17.21	16.21	21.31	20.56
Denver		11.55	12.53	13.03	13.72	11.39	11.90	11.55	12.98	.....	.....	.....	20.84
Detroit**	.15	9.63	10.61	10.65	11.91	9.58	10.29	9.68	11.16	17.38	16.38	21.48	20.73
Houston**		8.67	9.48	11.35[3]	10.23	8.00	8.31	8.08	13.10	17.50	16.55	21.55	20.85
Kansas City	.15	10.53	11.37	10.95	12.70	10.39	10.91	10.55	11.72	17.17	15.87	21.87	21.12
Los Angeles		10.35[1]	12.15	12.10	12.40	10.30	10.45	10.25	14.20	18.30	17.35	22.90	22.20
Memphis	.15	9.78	10.50	10.95	11.44	9.47	9.82	9.63	12.85	18 59	16 68	22 69	21 04
Milwaukee**	.15	9.51	10.49	10.42	11.68	9.35	9.94	9.51	11.04	17.24	16.24	21.34	20.59
New York**	.10	10.17	10.88	11.45	12.47	10.32	11.00	10.54	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia	.10	9.60	10.10	10.76	11.35	9.70	9.95	9.75	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	9.37	10.68	11.83	11.64	9.21	9.72	9.37	11.40	17.10	16.10	21.20	20.45
Portland		10.40	12.25	12.35	12.40	10.55	11.00	10.40	16.65	18.60	17.85	22.70	22.15
San Francisco	.10	10.75	11.75[2]	11.85	12.80	10.90	11.20	10.65	15.20	18.30	17.35	22.90	22.20
Seattle		11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.20	18.60	17.85	22.70	22.15
Spokane	.15	11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.35	17.75	17.95	21.58	22.30
St. Louis**	.15	9.57	10.73	10.66	11.74	9.43	9.95	9.59	11.43	17.48	16.48	21.58	20.83
St. Paul	.15	8.97	9.64	10.79	11.14	8.81	9.32	8.97	11.64	.....	16.69	21 79	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. **These cities are on order quantity pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—⅛" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—⅝-2 15/16". Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1¾" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 13 ga. & heavier: [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Oct. 23, 1961)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	6..00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	71.00†
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Lyles, Tenn. *T3*	.....	.....	.....	.....	73.00
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	71.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, Toledo, *I4*, $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct; 13 to 13.5 pct; 13.5 to 14 pct, add $1. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container) — *Pct*

Plain finish—packaged and bulk	43
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	43

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container) — *Pct*

Plain finish—packaged and bulk	43
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	43

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk	43
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	43

(Minimum plating charge — $10.00 per item. Price on application assembled to bolts.)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 lb
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

NOTE: Ferroalloy prices are published in alternate issues.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	AISI
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Oct. 23, 1961)

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50	32.00	29.50	47.50	38.00	46.50	—	19.25-21.50	—	19.75-21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	26.75	29.25-29.75	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	31.50	35.00-36.75	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	42.25	71.75	54.75	64.75	30.00	31.50-38.00	31.25-31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	43.50	46.75	45.00	49.50	56.75	49.50	76.75	62.25	75.25	40.25	40.25	42.50	38.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	29.75	33.25-29.75	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R3.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown. *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7,* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6;* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2,* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago. *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1:* Claymont, Del; *P2.*

Forging billets: Ambridge Pa., *B7;* Midland Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
	Col	Col	Col	Col	Col		
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3***	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Chicago *W7*	173	.....	.....	.....	.....	9.00	9.55†
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	192	...	214	198	9.10	9.80
Donora Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	175	192	...	214	198	9.10	9.80††
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	.....	.....	213	9.95	10.50
Rankin Pa. *A5*	173	187	.....	.....	193	9.00	9.55
So. Chicago *R3*	173	187	.....	.....	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	236	.....	9.95	10.50
SparrowsPt. *B3***	175	.....	...	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only. †† 0.115¢ zinc.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $280 per net ton.

STANDARD T. & C.	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 11.50¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

Furnace, beehive (f.o.b.)	Net-Ton
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.70
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

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FERROALLOY PRICES

NOTE: Prices of Boiler Tubes, Clad Steel, C-R Spring Steel, Electrical Sheets, Electrodes, Electroplating Supplies, Metal Powders, Rails and Track Supplies, and Refractories are published in alternate issues.

Ferrochrome

Base prices per lb of contained chromium, carload lots of lump material in bulk, unless noted.

High-Carbon

4.00-6.00% C, 55-63% Cr, 8-12% Si, .03% max S 23.00
4.00-7.00% C, 67-71% Cr, 1-2% Si.. 24.00
4.25% max C, 58-65% Cr, 1% max Si, .03% max S 24.00
5.25% max C, 58-65% Cr, 3% max Si, .03% max S 22.00

Low-Carbon

2.00% max C, 65-71% Cr, 2% max Si 32.50
.75% max C, 67-73% max Cr, 2% max Si 33.00
.025% max C, 68-73% Cr, 2% max Si 33.50
.05% max C, 67-73% Cr, 2% max Si 33.00
.05% max C, 63-67% Cr, 4-6% Si... 32.50

Bricks or Pellets

.025% max C, 63-68% Cr, 4-7% Si.. 32.50
.025% max C, 68-71% Cr, 2% max Si 33.00
.010% max C, 63-68% Cr, 4-7% Si.. 33.00
.010% max C, 68-71% Cr, 2% max Si 33.50

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Ferrochrome Silicon

Carloads, delivered lump, per lb of material.
39-41% Cr, .05% max C, 42-45% Si. 11.50
44-47% Cr, .15% max C, 37-39% Si. 12.60

Chromium Metal

Per lb chromium, contained, packed delivered, ton lots, 97.25% min. Cr, 1% max. Fe.
0.10% max. C $1.29
9 to 11% C, 88-91% Cr, 0.75% Fe... 1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.
Carloads $1.15
Ton lots 1.17
Less ton lots 1.19

Calcium-Silicon

Per lb of alloy, lump, delivered, packed.
30-33% Cr, 60-65% Si, 3.00 max. Fe.
Carloads, bulk 24.00
Ton lots 27.95
Less ton lots 29.45

Calcium-Maganese—Silicon

Cents per lb of alloy, lump, delivered, packed.
16-20% Ca, 14-18% Mn, 53-59% Si.
Carloads, bulk 23.00
Ton lots 26.15
Less ton lots 27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.
Ton lots 21.15
Less ton lots 22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed max. St. Louis, V-5: 38-42% Cr, 17-19% Si, 8-11% Mn, packed.
Carload lots 18.45
Ton lots 19.95
Less ton lots 21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.
Carload bulk 19.20
Ton lots to carload packed 21.15
Less ton lots 22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Houston, Tex.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
Rockwood, Tenn.	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.
Briquets, delivered, 66 pct Mn:
Carloads, bulk 13.70
Ton lots packed in bags 16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

Mn	Palmerton, Pa. 10 lb, pig	35 lb, down	Neville Is., Pa. 35 lb
16-19%	$98.00	$96.00	$100.50
19-21%	100.00	98.00	102.50
21-23%	102.50	100.00	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.
Carload, packed 45.75
Ton lots 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.
Carloads, bulk 34.25
Ton lots, palletized 36.25
250 to 1999 lb 39.00
Premium for Hydrogen - removed metal 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn (Bulk)	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.
Carloads bulk 11.60
Ton lots, packed 13.25
Carloads, bulk, delivered, per lb of briquet 14.00
Briquets, packed pallets, 2000 lb up to carloads 16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, frieght allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.
Carloads, bulk 8.00
Ton lots, packed 10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si	13.50	75% Si	16.90
65% Si	15.75	85% Si	18.60
	90% Si	20.00	

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.
Openhearth 3.20
Crucible 3.30
High speed steel 3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb	2.40	3.30	4.55

(Effective Oct. 23, 1961)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y. per lb.
Carloads, bulk ..... 9.85¢
Ton lots ..... 11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.63

Ferrocolumbium, 58-62% Cb, 2 in. x D, del'd per lb con't Cb
Ton lots $3.45
Less ton lots 3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta $3.40

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.89

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage, per gross ton $120.00
10 tons to less carload $131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Vanadis, O., O., freight allowed, ton lots, per lb contained Ti $1.35
Less ton lots (200 lb and up) $1.37

Ferrotitanium, 30% low carbon, 0.10% C max., 27-32% Ti, Vanadis, O., freight allowed, per lb contained Ti, ton lots $1.35
Less ton lots (200 lb and up) $1.40

Ferrotitanium, 1-3% Carbon, 17-20% Ti, f.o.b. shipping point, freight allowed, carload per net ton $250.00
Ton lots $260.00

Ferrotungsten, ¼ x down packed per pounds contained W, ton lots delivered ..... $2.45 (nominal)

Molybdic oxide, briquets per lb. contained Mo, f.o.b. Langeloth, Pa. $1.62
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.59

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.
Carload, bulk lump ..... 18.50¢
Ton lots, packed lump ..... 20.50¢
Less ton lots ..... 21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .... $1.38

Zirconium silicon, per lb of alloy
35-40% del'd, carloads, bulk.. 26.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B
2000 lb carload $5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound ..... 30¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.
Ton lots per pound ..... 18.25¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots.. $1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up
10 to 14% B ..... .85
14 to 19% 1.20
19% min. B 1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb & over
No. 1 ..... $1.05
No. 79 ..... 50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd
Ton lots (packed) $1.46
Less ton lots (packed) 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 2.15

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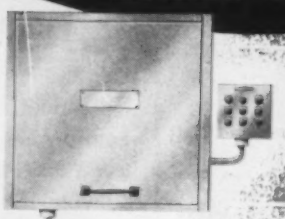

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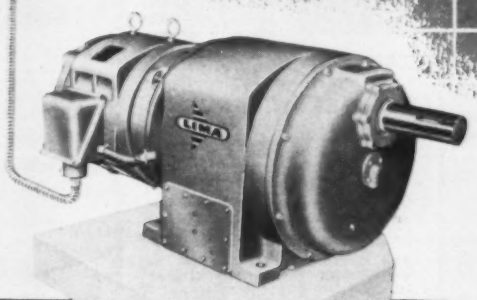

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MERCURY ARC RECTIFIERS
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Primary 4160 V. Delta; Secondary 277 V. to Neutral with INTERPHASE REACTORS
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SEND FOR OUR FREE CATALOG

S. America Draws Cleveland Dealers

Demand from new markets in South America is boosting the used machinery business in Cleveland.

Domestic sales are coming back strong in the last quarter. And export is a new factor.

■ Used machinery business in the Cleveland area is getting a lift from South American demand. Domestic sales have come back strong in the fourth quarter.

"We are finding that South American companies are getting into appliance making at relatively low investment, thanks to good used U. S. machinery and obsolete dies which they get for a fraction of new cost," says Arthur Markell, president, Buckeye Machinery Co., Cleveland.

Buckeye and other Cleveland companies have shipped presses and similar equipment to South America, mostly to subsidiaries of licensees of U. S. companies.

Colombia Deal—"A good example of how this is working was a 100,000 lb mechanical press we recently shipped to Colombia," Mr. Markell says. "The buyer is going into the stove-making business. He was able to get obsolete but very usable dies from U. S. appliance makers for 10 pct of what new ones would cost.

"For Colombia, these would still be very modern stoves. We supplied the press for about one quarter the cost of a new U. S. model and they could get about the same price on English or German models. But they preferred the U. S. manufacturer.

"Firms going into business like stoves have a remarkable advantage there. Once they are in business, competitive imports must face a high tariff barrier. Licenses to import machinery also last only about three months, so deliveries are fairly critical," he says.

Equal Costs — Crating, rigging and loading costs were about equal to the cost of a machine. It was sent by rail to New York and transshipped from there, rather than through the St. Lawrence Seaway.

Domestic business in Cleveland has construction activity to thank for a revival since the summer low. Cleveland dealers report that it has come back 50 pct since then. Biggest demand in construction and construction machinery is for punch presses, larger press brakes, bending rolls, angle rolls, and heavy stamping equipment.

Top notch stocks of used machinery in dealer shops still offer buyers the best selection in years.

"I didn't ask you for an honest opinion. I asked how you like working here!"

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2—29" 2-HIGH HOT SHEET MILLS with tables.
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1—18" x 28" COLD MILL, 2-high, 200 HP drive.
2—10" x 14" 2-HIGH COLD MILLS, 100 HP DC drives, with one coiler.
1—8" x 12" 2-HIGH COLD MILL, 50 HP motor.
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1—9" BAR MILL, 3-high, five stands.
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1—LEVELLER FOR ¼" PLATES, 9 rolls, 9" dia. x 108" face, 1940.
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1—3000 HP GEAR DRIVE, ratio 4.8 to 1.
1—1000 HP GEAR DRIVE, ratio 10 to 1.
1—1200 HP GEAR DRIVE, ratio 9.47 to 1.
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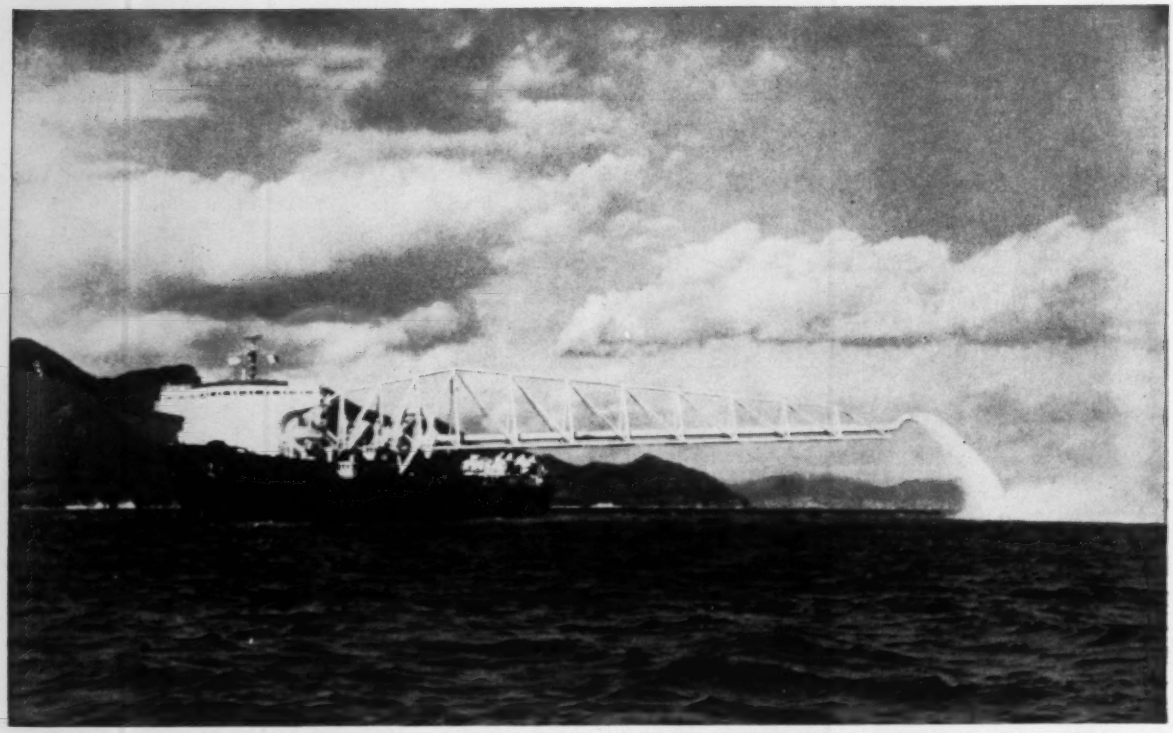
(BEST IN BLAST CLEANING)

PANGBORN CORPORATION, 1500 Pangborn Blvd., Hagerstown, Md.; Pangborn Canada, Ltd., 47 Shaft Rd., Toronto (Rexdale), Canada; or phone district office in Yellow Pages under "Sand Blast Equipment." *Manufacturers of Blast Cleaning, Vibratory Finishing, Dust and Fume Control Equipment —Rotoblast® Steel Shot and Grit®.*

Pangborn
OF HAGERSTOWN

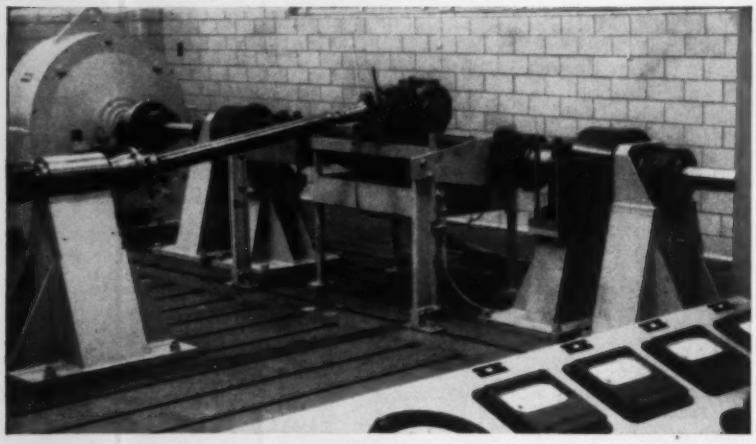


"Zulia" designed by Welding Shipyard Division of National Bulk Carriers; owned by Seadredge Company, an affiliate of National Bulk Carriers.

One Timken® bearing centers 1,000-ton boom on world's largest dredge

The channel dredge, "Zulia", mounts a whopper of a boom—1,000 tons, 437 ft. long. It pivots in a 180 degree arc. To maintain the radial position of the discharge boom and take the tremendous loads, the designers worked with Timken bearing sales engineers to select the best bearing for the job. Only one was needed, a 72″ bore, 79″ O.D. double-row bearing. Best of all, this is a standard Timken® tapered roller bearing—showing the huge size range available. And Timken bearings are also used in the Cone-Drive reducer that drives the boom's rotating base.

Their tapered design lets Timken bearings take any combination of radial and thrust loads. Full-line contact between rollers and races gives *extra* load-carrying capacity. And because Timken bearings are designed to roll true, they virtually eliminate friction.



HELPING KEEP TIMKEN BEARINGS YOUR NO. 1 BEARING VALUE is this huge dynamometer in our physical laboratory. It's typical of test equipment we use to assure long life and minimum maintenance in Timken bearings.

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The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits. Canadian Division: Canadian Timken, St. Thomas, Ontario.